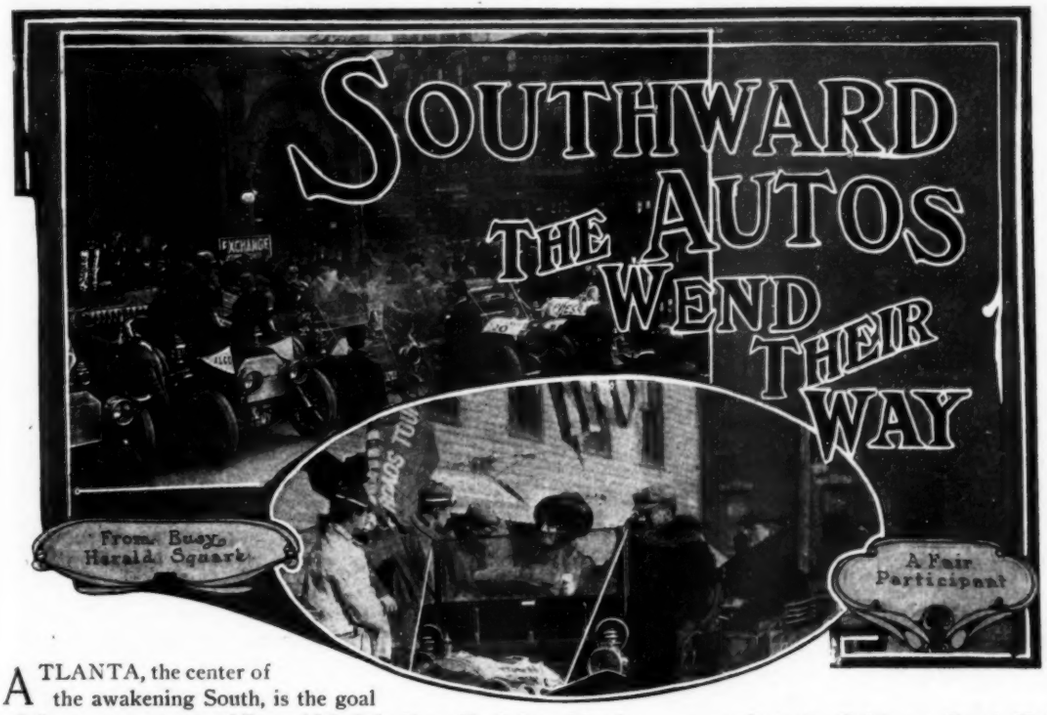
VOL. XXI NEW YORK—THURSDAY, OCTOBER 28, 1909—CHICAGO No. 18

THE AUTOMOBILE

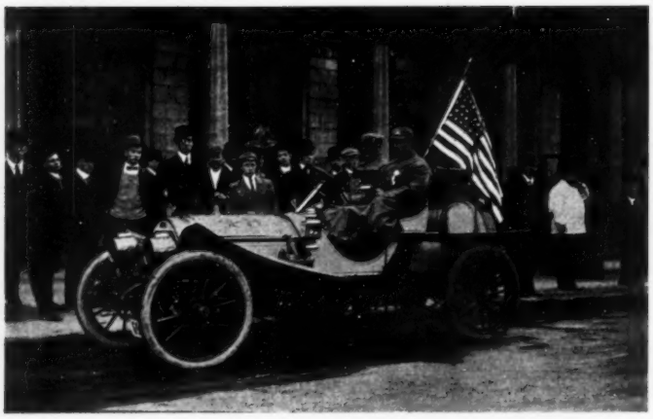


ATLANTA, the center of the awakening South, is the goal of forty-seven automobiles which left New York last Monday, prepared for a ten days' struggle with roads of the best and worst, and all the intermediate varieties. Under the auspices of the New York *Herald* and the Atlanta *Journal*, these pioneers, the advance guard, it is hoped, of many thousands, have undertaken to blaze the touring way between the metropolis of the North and that of the South, enduring what hardships may befall for the sake of the automobilists' watchword, "Good Roads!"

At 9 o'clock of the bright Autumn morning Herald square flaunted bunting and pennants from three-score cars, and a solid line stretched up Sixth avenue in the shadow of the elevated tracks. Then the escorting cars of the New York Automobile Trade Association swept down Broadway, and the waiting column turned into their wake. Not until Fifth avenue was reached did the line reveal its full length; then, freed from the press of traffic, it drew up in close order, still ten blocks long, and charged for the Battery.

Unusual in a tour of this sort, and indicative of the interest and enthusiasm with which the South has taken up the good roads movement, are the many entries by the cities along the route and by their boards of trade or of commerce. Atlanta, Lynchburg, Va.; Charlotte, N. C.; Roanoke, Va.; Moultrie, Ga.; Anderson, Ga.; Spartansburg, S. C.; Winston-Salem, N. C., and Commerce, Ga., all find representation in the line. Georgia, the Carolinas and Virginia will welcome the tourists as forerunners of almost a new era; an era of prosperity and activity, and of free intercourse with the neighboring States.

The tourists include many notables, both of automobiling and other circles. Recipient of a most flattering attention was the great "Ty" Cobb, whose trusty bat has twice helped Detroit to win a pennant. The speedy player, who may now be regarded as one of the automobile fraternity, was at the wheel of the Chalmers-Detroit official car. Frank X. Zirbies, who drove a Mitchell across the continent on a military expedition, headed the line as pacemaker. Many of the cars were gay with Paris millinery and other feminine accessories, for several of the contestants took their entire families with them. One of these parties was that of Jacques Futrelle, the story writer and originator of "The Thinking Machine." Mrs. Joan Cuneo, who has often demonstrated her skill at the steering wheel, brought out her favorite



The Blue Book Car, N. H. VanSicklen, Sr., and E. R. Mixer

Mr. and Mrs. "Reoite" Owen Hold a Reception

Rainier for the occasion, and had as a passenger Lewis Disbrow, the daring driver of Rainier racing cars. Alexander Schwalbach, also touring *en famille*, entrusted the guidance of his Locomobile to his daughter, Miss Mildred Schwalbach, who is a driver of no mean skill.

CLASS 1—CARS COSTING $4,001 OR MORE

4 Thomas, J. J. Woodside, Atlanta, Ga.
6 Stearns, Col. Wm. L. Peel, Atlanta, Ga.
17 Thomas, J. Lee Barnes, Atlanta, Ga.
22 Oldsmobile, Henry J. Lamar, Jr., Atlanta, Ga.
23 Thomas, Charles I. Ryan, Atlanta, Ga.
30 Renault, Renault Freres Selling Agency, New York City.
35 Matheson, Matheson Automobile Company, New York City.
44 Benz, Chamber of Commerce, Atlanta, Ga.
49 Apperson, Automobile Blue Book, New York City.

CLASS 2—CARS COSTING FROM $3,001 TO $4,000

9 Thomas, Mrs. Elizabeth de Giers, New York City.
38 Pope-Toledo, Chamber of Commerce, Lynchburg, Va.
48 White, Walter C. White, New York City.
54 Franklin, W. C. Cleveland, Greensville, S. C.

CLASS 3—CARS COSTING FROM $2,001 TO $3,000

20 Premier, City of Charlotte, Charlotte, N. C.
25 Pennsylvania, Pennsylvania Sales Agency, Atlanta, Ga.
34 Knox, W. A. Kelly, New York City.
39 Selden, Evelyn Harris, Atlanta, Ga.
46 Oldsmobile, E. B. Douglas, Miami, Fla.
52 Corbin, Chamber of Commerce, Roanoke, Va.
53 Oldsmobile, Frederick Weiss, Brooklyn, N. Y.

CLASS 4—CARS COSTING FROM $1,251 TO $2,000

2 White, Board of Trade, Commerce, Ga.
5 White, Chamber of Commerce, Anderson, Ga.
7 White, Board of Trade, Moultrie, Ga.
8 Chalmers-Detroit, F. D. Hughes, New York City.
10 Buick, Chamber of Commerce, Spartansburg, S. C.
14 Studebaker, Board of Trade, Winston-Salem, N. C.
16 Buick, William Oldknow, Atlanta, Ga.
21 Jackson, Jacques Futrelle, Scituate, Mass.
26 Maxwell, Maxwell-Briscoe Motor Company, Tarrytown, N. Y.
27 Maxwell, Maxwell-Briscoe Motor Company, Tarrytown, N. Y.
29 White Star, White Star Auto Company, Atlanta, Ga.
43 Chalmers-Detroit, Read Holliday, New York City.
50 Franklin, George H. Storck, Jacksonville, Fla.

CLASS 5—CARS COSTING FROM $851 TO $1,250

18 Maxwell, Automobile and Commercial Ass'ns, Charlotte, N. C.
19 Studebaker, W. J. Stoddard, Atlanta, Ga.
31 Reo, R. M. Owen & Company, New York City.
42 Regal, E. D. Crane & Company, Atlanta, Ga.

CLASS 6—CARS COSTING $850 OR UNDER

28 Maxwell, Maxwell-Briscoe Motor Company, Tarrytown, N. Y.

OFFICIAL CARS (Non-Contesting)

Pacemaker Mitchell, Frank X. Zirbies, Racine, Wis.
Judges' Car, Chalmers-Detroit, A. L. Westgard, New York City.
Official Car, Alco, American Locomotive Company, New York City.
Official Car, Stearns, Wyckoff, Church & Partridge, New York City.
Checkers' Car, Chalmers-Detroit, T. R. Cobb, Detroit, Mich.
Press Car, Rainier, Mrs. Joan N. Cuneo, New York City.
Press Car, Locomobile, Miss Mildred Schwalbach, New York City.
Tire Car, Craig, Ajax-Grieb Rubber Company, New York City.

Although a number of the original entrants had been withdrawn, or failed to appear for various reasons, it was still an imposing procession.

Crossing New York Harbor to Staten Island—The police arrangements had been so admirably planned that the parade made its way downtown with scarcely a check, and drew up at the Battery at half-past ten. Two special ferryboats were in readiness, and on these the tourists were soon embarked. The trip across the harbor was quickly made on the speedy boats. At the St. George, S. I., slips the cars were met by the Richmond County Automobile Club, headed by President Charles A. Schultze, which formed an honorary escort during the brief run across Staten Island, and sped them with best wishes.

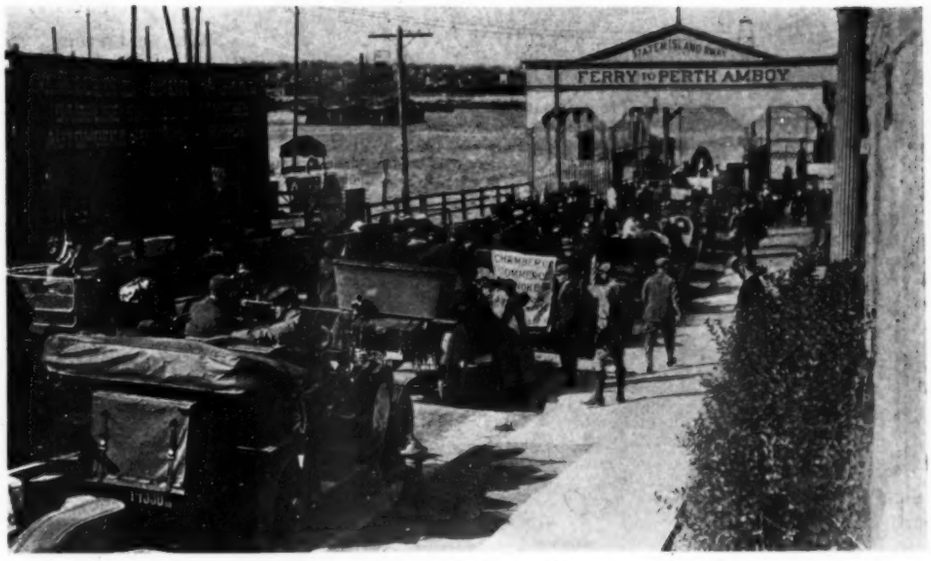
Several trips of the ferry at Perth Amboy were necessary to carry the tourists across from Tottenville. Mayor A. Bollschweiler, of Perth Amboy, met the procession at the ferry, and after the ranks had been formed a quick run was made to the Packer House for luncheon.

Through Jersey's Hills and Valleys—At half-past one the tourists were called from their tables, and E. L. Ferguson, of Buffalo, the starter, assisted by the checkers, Mortimer Reeves, of New York City, and Inman Gray, of Atlanta, began sending away the cars at intervals of one minute. New Jersey's hills were glowing in red and brown Autumn foliage, and the crisp air was neither too warm nor too cold for comfortable touring. The cars soon broke ranks, each proceeding at the pace most suitable to its driver, with regard only for the schedule that called for checking in at Philadelphia at a given time.

From Herald Square the Tourists Wended Their Way Southward

Near New Brunswick a gang of workmen was found busied in repairing the highway, with a steam roller in full swing crushing down the broken rock. The tourists greeted the sight with cheers, taking it as a good omen that they should so soon meet with a substantial evidence of the progress of the good roads gospel.

Dayton, Cranbury, and Hightstown were traversed in turn, and then Windsor, which proved its loyalty to the cause by displaying a big steam roller busied in resurfacing the macadam. Near Trenton many of the signs which had been posted for the tour had been torn down, partly, it was said, by the town authorities. This unnecessary piece of vandalism caused some confusion among the branching roads just outside the city.



Of Course the Perth Amboy Ferry Had a More Than Busy Morning

Philadelphia End of First Day's Run—Over the big steel bridge spanning the Delaware River the tourists sped into Pennsylvania, seeking new states to conquer. Active road building operations were in progress near the villages of Trevose and Bustleton. Beyond the latter village, and just on the outskirts of Philadelphia, Pacemaker Zirbies met the scout car of the Quaker City Motor Club. A little further on, near the Widener Memorial school, the police escort provided by the Philadelphia authorities, together with a number of cars of local automobile enthusiasts, awaited the tourists. It was a quarter past four when the vanguard rolled in, and all waited a time to allow the trailers to catch up. Contestants and official cars came dashing in at frequent intervals, and when the line was nearly complete another start was made and the procession swept into the Quaker City, down Broad street to the City Hall.

The checking officials unfurled their standards in front of the quarters of the Quaker City Motor Club, in the Hotel Walton, and were soon busy taking the time of the contestants as each in turn came up. Only two cars failed to appear on schedule, the Oldsmobile, driven by Henry J. Lamar, Jr., of Macon, Ga., and the Pope-Toledo, in charge of Powell Glass, of Lynchburg, Va.

The two delinquents appeared in short order, however. The Oldsmobile driver reported three tire blowouts, for which no time allowance is made under the rules, and in addition a twenty-minute hold-up by a leisurely freight train on a railroad crossing. He received a penalty of twenty-four points. The Virginian escaped with six points marked up against it.

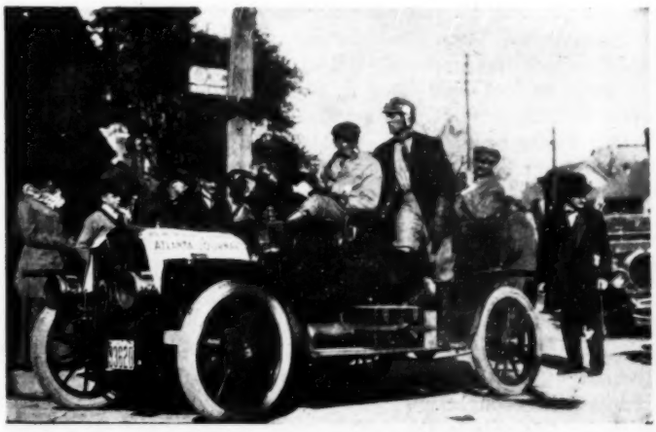
Gettysburg, Pa., Oct. 26—The second day's run of 120 miles ended this evening when the tourists sped into the city that gave its name to the battlefield on which the tide of rebellion was finally turned. Thirty-seven of the thirty-eight contestants arrived on time and without penalty. The thirty-eighth, the Pope-Toledo entered by the Chamber of Commerce of Lynchburg, Va., and driven by Powell Glass, met with mechanical trouble, and was reported to have returned to Philadelphia, thus withdrawing from the tour.

To-day's trip gave additional proofs of the hold the good roads movement has taken on the country. In every city and village the tourists met with an enthusiastic greeting, and the inhabitants showed that they appreciated the purpose of the run, as well as enjoying the holiday for which it gave excuse.

If all the roads on the route to Atlanta were like those which gladdened the autoists for the first hour or two out of Philadelphia, the tour might have disbanded on the spot. Through Ardmore, Bryn Mawr, Villa Nova, Rosemont and other suburbs of the Quaker City, the highways were beautifully smooth, and the cars rolled along their oiled surfaces as if on rails. The Southerners were loud in their praise, one and all asserting that these were the sort of roads they wanted in their own states.

But after Exeter, Pa., had been passed, conditions changed, and the ubiquitous water-break held sway. Progress was by a continuous series of bumps, which would form an admirable subject for a Coney Island side-show. The official Knox car, driven by Joseph W. Jones, with Referee Scarritt as passenger, fell a victim to the extent of a broken spring. The referee was forced to take passage with R. M. Owen, who came by in his Reo most opportunely, and offered his servicees.

All contestants had been warned to look out for police traps



Major John S. Cohen, Managing Editor Atlanta "Journal"

Mitchell Pacemaker With a Notable Cargo

Miss Schwalbach Successfully Copies Late Paris Styles

at Lancaster, Pa., for it was said that the authorities of that town had failed to appreciate the purposes of the tour, and had threatened to have an extra force of constables on duty. No one had any trouble, however, and policemen did not seem unusually numerous.

York, Pa., was the noon stop, ninety miles from Philadelphia. For the rest of the day's trip the roads were of the worst. A heavy toll was called for at the mile-long bridge spanning the Susquehanna, between Columbia and Wrightsville; the fee was forty cents, plus twenty additional for each passenger in excess of four.

Gettysburg turned out en masse to receive the tourists. The town officials took the visitors in tow, and after the cars had been checked in, many made a trip to the battlefield. The contestants and their guests posed for a photograph on Little Round Top, which was one of the most desperately contested points in the historic three-day struggle.

To-morrow's run, from Gettysburg to Staunton, Va., will be the longest of the tour, the distance being 180 miles.

DETROIT MAY HAVE A SPEEDWAY

DETROIT, Oct. 25—There is a strong likelihood of Detroit becoming the possessor of a motor speedway similar to that recently put in commission at Indianapolis. Such a project has been talked of for some time, but nothing definite was done. Now it is being revived, and the matter has progressed to a point where two sites are under consideration by those interested in the undertaking. One of these is on the east side and the other in the north end, both easily accessible from all the factories in the city. The plan as outlined is to not devote the speedway to racing events, but have it utilized by manufacturers for testing purposes, each concern participating to pay a proportionate part of the cost. With the rapid increase of the industry and the need of more adequate testing grounds than now exist it is argued that the enterprise could not fail.

"Ty" Cobb, Famous Ball Player, Is Touring Southward

VANDERBILT CUP RACE COMES NEXT

Saturday morning at 9 o'clock the Vanderbilt Cup race will be again contested over the revised and shortened Long Island course. Twenty-six cars will start in the three events: fifteen racing for the cup itself, over 22 laps of the course, four in the Wheatley Hills sweepstakes, over 15 laps, and seven in the Massapequa sweepstakes, going 10 laps. The three races, according to the fashion which is growing in popularity, will be run simultaneously. Preliminary practice, which has been constant for the past week, shows that the predictions made for the course were by no means unfounded. Tuesday morning Bert Dingley, driving his Chalmers-Detroit, set the record for the circuit at 11 minutes flat, a speed for the 12.64 miles of 68.9 miles an hour. The complete entry list follows:

VANDERBILT CUP RACE

Classes 1 and 2—Distance 22 Laps—278.08 Miles

Practice Number	Car	Driver
1	Simplex	L. A. Mitchell
2	Isotta-Fraschini	Joe Seymour
3	Chalmers-Detroit "40"	Bert Dingley
4	Chalmers-Detroit "40"	L. B. Lorimer
5	Fiat	Lewis Strang
6	Alco	Harry F. Grant
7	National	John D. Aitken
8	National	Charles C. Merz
9	Apperson "Jack Rabbit"	Hugh N. Harding
10	American Roadster	Willie Haupt
11	Buick	Louis Chevrolet
12	Fiat	E. A. Hearne
14	Fiat	E. H. Parker
15	Marmon	Harry Stillman
16	Mercedes	S. E. Wishard

WHEATLEY HILLS SWEEPSTAKES

Class 3—Distance 15 Laps—189.60 Miles

31	Moon	Philip Wells
32	Marion	George L. Reiss
33	Marmon	E. A. Harroun
34	Columbia	R. W. Wilcox

MASSAPEQUA SWEEPSTAKES

Class 4—Distance 10 Laps—126.40 Miles

41	Chalmers-Detroit "30"	William Knipper
42	Chalmers-Detroit "30"	Joe Matson
43	Maxwell	Martin Dooly
44	Maxwell	Arthur See
45	Maxwell	Thomas Costello
46	Hudson "Twenty"	George Ainslie
47	Atlas	Elmer Knox

AMERICAN ROAD MAKERS IN SESSION

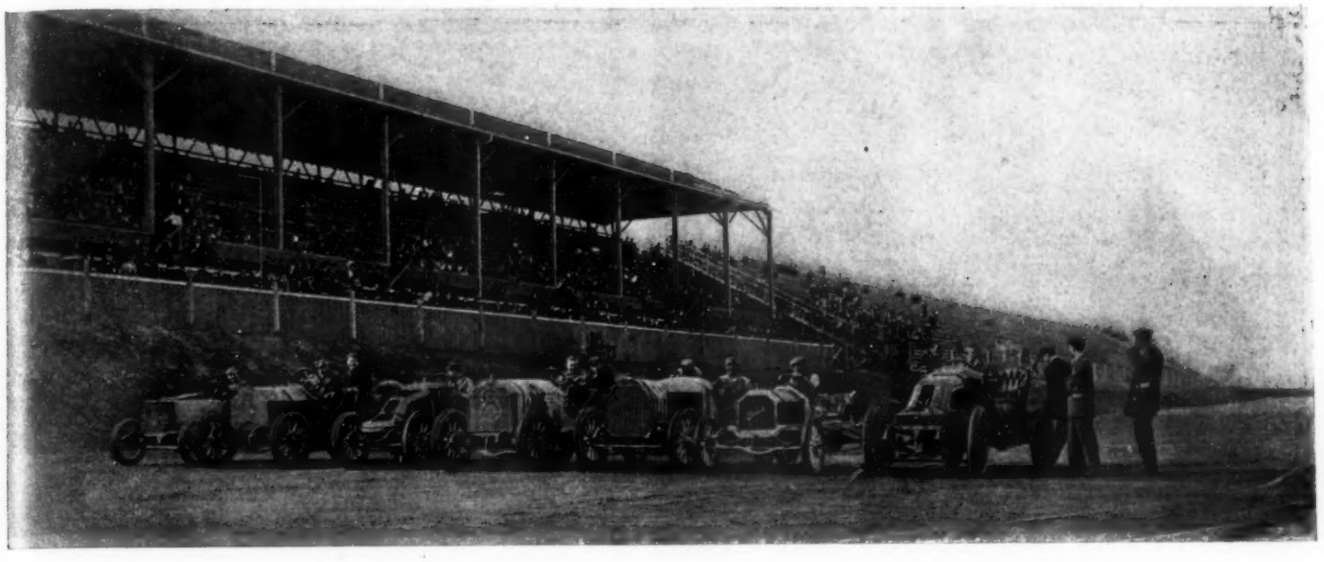
COLUMBUS, O., Oct. 26—Delegates to the number of 900, representing 33 States and territories of the United States, attended the first day's session of the Good Roads Congress, which is a joint meeting of the American Road Makers' Association, the Ohio Good Roads Federation, and the County Commissioners' Association of Ohio. Automobile owners and auto clubs are in evidence in the meeting, but their efforts are only contributory.

Because of the death of a relative, Governor Judson Harmon, of Ohio, did not deliver the welcoming address. His secretary, George L. Long, substituted pleasingly, and was followed by Mayor C. A. Bond, and Secretary J. Y. Bassell of the Chamber of Commerce. The responses were made by James H. MacDonold, president American Road Makers' Association; William M. Hager, president Ohio Good Roads Federation, and O. J. Townsend, secretary of Ohio County Commissioners' Association.

One of the principal addresses of the day was that of Logan Waller Page, director of the office of public roads, U. S. Department of Agriculture, who talked on "The National Government as a Factor in Road Improvement."

Hon. Nahum J. Bachelder, of Concord, N. H., master of the National Grange, discussed the matter of co-operation in road building from the standpoint of the agriculturalist.

The sessions willl continue Wednesday, Thursday, and part of Friday. One of the features of the program for Friday is the opening of the question box in which many interesting matters will be brought up. Automobiles are to be used to transport the delegates to the fair grounds, to view the large exhibit of road building machinery.



First Line-Up of Notable Racing Craft on Atlanta Automobile Speedway, Robertson, Oldfield, and Basle Being Included

ON GEORGIA'S RECORD RACE TRACK

ATLANTA, GA., Oct. 23—The Atlanta automobile speedway has demonstrated that it is ready. At any rate, five miles in 3:52 3-5 looks very much like it. The demonstration was made this afternoon with a few of America's fastest cars and some of America's best drivers here to see that the thing was well done.

In order that the publicity end be properly taken care of, newspaper men were the invited guests of the day, and before the races they were served with a real old Georgia barbecue, with Brunswick stew and some exceedingly "near" beer as a side-line. More than a hundred Georgia newspaper men, along with some Associated Press and United Press notables, were on hand to lend an air of *eclat* to the occasion.

When the cars were put on the track there was no formal program for them to follow. They were merely sent against time, with Fred Wagner behind the stop watch, and no prizes up for broken records. But records were broken, all right. Oldfield, in his 120-horsepower Benz, was the star performer, for he made five miles from a flying start in 3:52 2-5. This is the time as taken: 2 miles, 1:31; 3 miles, 2:21 3-5; 4 miles, 3:03; 5 miles, 3:52 3-5.

The most brilliant performer was Robertson in his 90-horsepower Simplex. He did the five miles in 3:59 4-5. His fractional time was: 2 miles, 1:34 3-5; 5 miles, 3:59 4-5; 6 miles, 4:34 4-5.

Ben Kirschner, under orders not to smash up his Darracq machine, took things easy. His best time was a mile in 53 seconds, which shows the speed possibilities of the track.

A creditable showing was made by Florence Michael, a Georgia driver who goes by the racing name of "Cliquot." This youngster, who never drove a racer before in his life, hooked up wtih the ancient and terrible Pope-Toledo recently acquired by Asa G. Candler, Jr., and christened by him "The Merry Widow," and made good time. Here are the figures: 2 miles, 1:36; 3 miles, 2:45 2-5; 4 miles, 3:38 2-5; 5 miles, 4:34 3-5; 6 miles, 5:21 4-5; 10 miles, 8:42 3-5.

A remarkably good showing was made by Ed. Durant, one of the capitalists who built the track. He drove a stock Renault five miles in 5:08.

Charles Basle was not having much luck wtih either of his Renaults, but for all that managed to reel off two miles in 1:50.

The final event of the afternoon was a three-cornered friendly race, in which Robertson, Michael, and Basle took part. They finished in the order named. Michael, in the Pope-Toledo, led for two miles, but then Robertson made a runaway of it. Basle in his stock Renault was nearly lapped.

POPE-HARTFORD BEST IN PORTOLA RACES

OAKLAND, CAL., Oct. 23—Although somewhat marred by accidents, the races run here to-day were marked by the high average speed maintained and by the walkover in the longer contest, the winning car finishing with a lead of nearly forty miles. Three races were going on at once, all of the cars being started at approximately the same time. More than this the cars of the lowest class were eligible for the other two, and it was the rule rather than the exception that the cars were entered in all three of the races.

Thus the winning Pope-Hartford won the third race also, and only lost the second through the failure to enter in that. The Apperson, which came in second in the longer distance also won at the middle distance, so that each of these cars won two prizes.

The course consisted of a twenty-one mile circuit over dirt roads, but as subsequent events proved, it was very fast.

Cars of a piston displacement of from 231 to 450 cubic inches were elegible for the first race which consisted of seven laps, or approximately 150.5 miles. In the second race, all cars were eligible with piston displacements from 451 to 600 inches. In this class the competition extended over ten laps, making the distance 215 miles. In the big car class, the big race of the day, all competitors covered 12 trips around the circuit, making the total mileage approximately 258 miles. This class was open to cars having a displacement in excess of 600 inches, but smaller engines were not barred.

The times made were fast throughout, a Stearns car, driven by D. A. Bonney, making the fastest lap of the day, 18 minutes and one-fifth seconds, which is in excess of 71 miles per hour.

Of the fifteen starters, about half finished. The big race was won by Fleming in the Pope-Hartford number 4, time 3 hours 58 minutes and 15 seconds, an average of 64.51 miles per hour. Second place was taken by Apperson number 13, driven by Hanschue, two laps behind Fleming. Third place was won by Lozier number 12, with Harry Michener at the wheel, one lap behind the Apperson.

Fleming was also awarded the 7-lap race, the time not being given out. To the Apperson was awarded the 10 lap race, the time for that distance being 3 hours 12 minutes and 33 seconds. The Lozier was given second place in this race.

Several accidents to contestants served to mar the day's sport, thus, A. G. Linz, the machinist of the Maxwell, was painfully injured by the breaking of the flywheel of his motor. Early in the race the Chalmers-Detroit car sustained a broken wheel and Howard Warner, the driver, and his mechanic, James McCauley, were thrown from the machine and badly bruised.

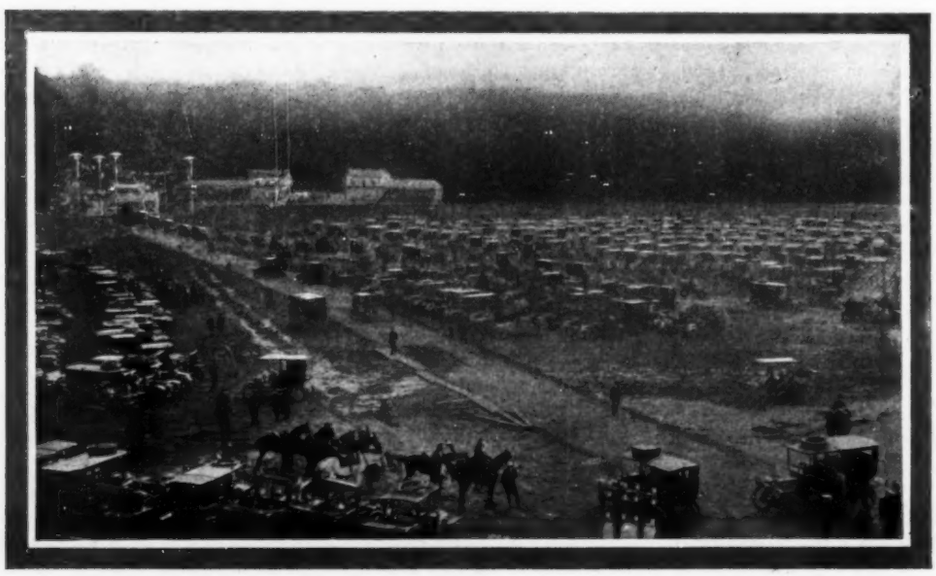
Count De Lambert in His Wright Aeroplane Flying Over the River Orge During the Juvisy Meeting

TWO MEETS START AVIATION PROGRESS IN ENGLAND

LONDON, Oct. 23—Donchester and Blackpool have held rival aviation meets during the past week, each boasting a goodly roll of English and French aeroplanes and aviators. The two towns have been engaged in a rather undignified controversy, each accusing the other of underhand methods in securing contracts, and as a result several of the astute Frenchmen have reaped a golden harvest. The quality of the sport, although not, of course, equal to that at Rheims, has been on the whole very good, and it seems there was room for both.

Doncaster was first away, opening nominally on October 15, but a strong gale kept the aeroplanes in their sheds. The following day Col. S. F. Cody went up about noon in his biplane. After flying about 1,000 yards he miscalculated his distance from the ground on a turn; his front wheel struck, and the machine turned a somersault. Cody was not hurt, but the machine was badly smashed, and was withdrawn for repairs.

In the afternoon the competitions started with an event for five circuits of the course, the distance being five and a half miles. Delagrange, in a Blériot monoplane, was the first to complete the trip, his time being 11 minutues 20½ seconds. Sommer, in a Farman biplane, ascended while Delagrange was still in the air, and for the first time in England two aeroplanes were seen flying together. Sommer completed 9 miles and 1,350 yards in 21 minutes 45 seconds.



On the Field at Juvisy—Indicating that Autoists Are Interested in Aeronautics

The Blackpool meet opened October 18. On the first day Farman led in the speed contest, covering 17 1-2 miles in 23 minutes. Rougier made the longest flight, 22 1-2 miles in 32 minutes. The following Friday Hubert Latham, in his Antoinette monoplane, made one of the most daring flights on record. He went up in the teeth of a thirty-mile gale, twice circling the course. With the wind ahead the machine seemed at times to stand still; but when Latham came about he was driven at terrific speed at least 80 miles an hour. At one time he barely escaped being carried to sea.

A surprising feature of both meets has been the number of English-built machines which have appeared. Although these have not been able to compete successfully with the well-tried French craft and their experienced pilots, they have demonstrated that England is not so far behind in the progress of aviation as might have been supposed. Henry Farman carried off the $10,000 prize for the longest flight and $2,000 for the fastest three laps, and Latham took the prizes for general merit and for the slowest lap.

AMERICA VICTORIOUS IN BALLOON RACE

PARIS, Oct. 20—The Gordon-Bennett cup for spherical balloons was won by Edgar W. Mix, who sailed from Zurich, Switzerland, to a point north of Warsaw, in Russian Poland. His distance is estimated at 680 miles. Alfred Leblanc, the French pilot, was second, with a distance of 520 miles. Mix was arrested by the Russian police on his landing, but was soon released. Owing to a report that he made a landing near Dettva, Hungary, the award of the cup was suspended, but the commission finally decided in his favor. As a result, the race will be held in America next year.

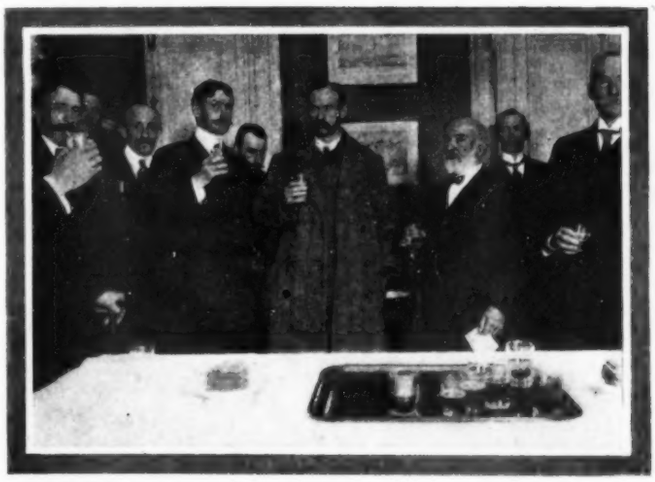
BISHOP RETURNS WITH AERO TROPHIES

Cortlandt F. Bishop, president of the Aero Club of America, arrived in New York October 24, bringing with him the Gordon Bennett trophy for aeroplanes won by Glenn Curtiss. Mr. Bishop has been abroad for six months, during which he covered 20,000 miles in his automobile, and witnessed all the aviation meets. He was elected vice-president of the International Aero Federation. One of the reasons for his return is the approaching election in the Aero Club of America.

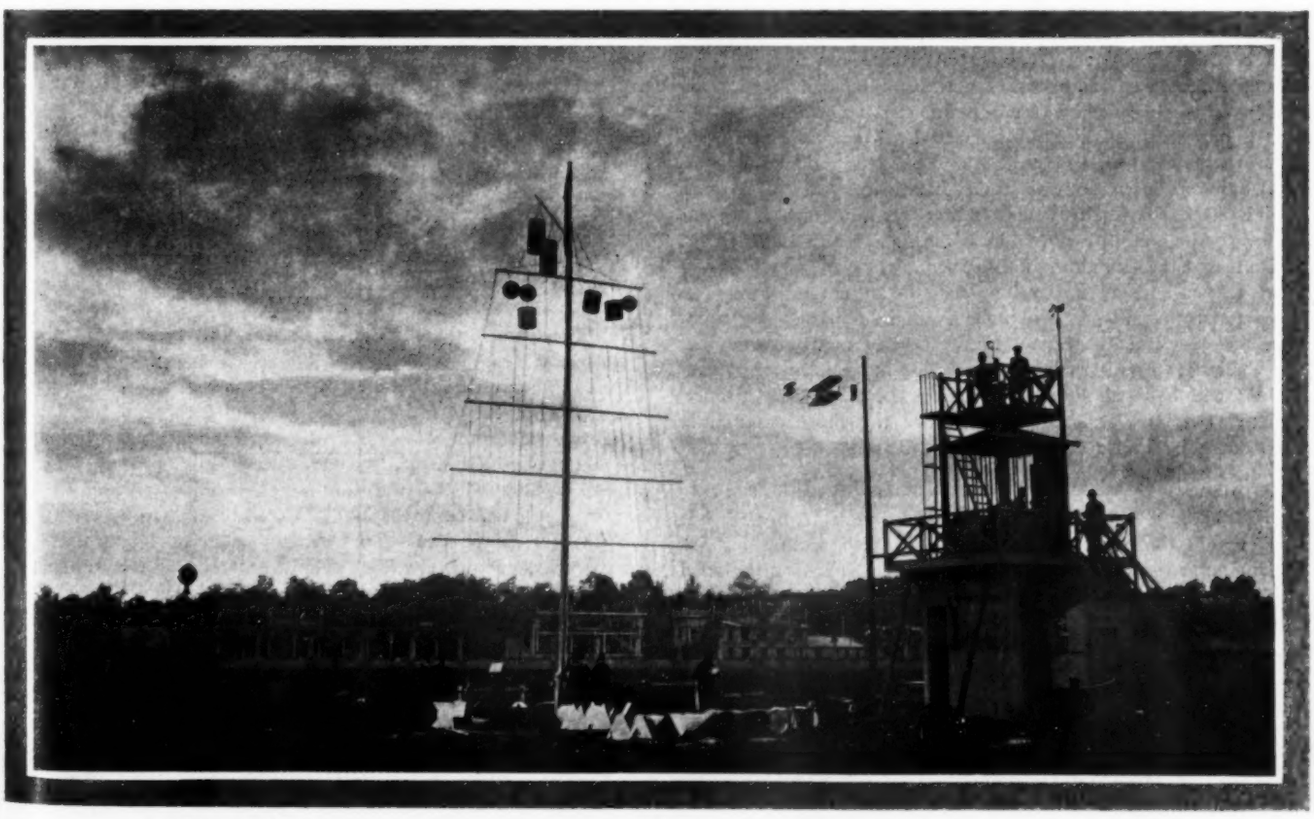
WRIGHT'S MILITARY PUPILS FLY ALONE

WASHINGTON, D. C., Oct. 26—Wilbur Wright this morning allowed his pupils, Lieuts. Lahm and Humphreys, to ascend alone in the army aeroplane, with which they have been making trial flights at College Park, Md. Lieut. Humphreys went up first, at 8:16. He rose easily and made two circles of the field, alighting easily. Lieut. Lahm, after a false start, got away at 8:41, and circled the field half a dozen times, turning several short circles. He stayed up thirteen minutees. Then Lieut. Humphreys tried again. He, too, made a false start, but ascended at 9:22 and remained in the air eight minutes, equaling his comrade's total time. Finally, Professor Wright took the levers and gave a short exhibition. He cut off the motor while at a considerable distance from the ground, and glided down gently.

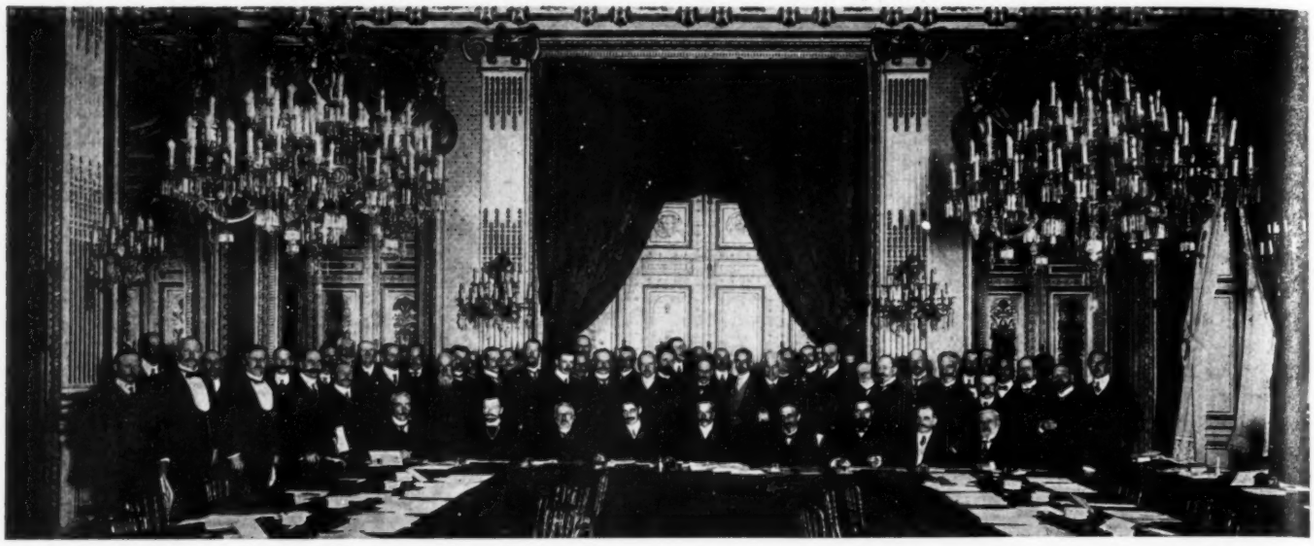
The training of the two officers, which has been in progress for nearly three weeks, is now practically completed. Hitherto Mr. Wright has always accompanied his pupils, although often allowing them to hold the levers. Five flights were made October 8. The following day Mr. Wright, alone, made a record of 58 3-5 seconds for a kilometer flight in a closed circuit. Most of his ascensions were made without the starting apparatus.



President Bishop and Winner Mix at Aero Club de France



Fortnight of Aviation at Juvisy—How Aeronautical Contests Are Conducted—Timers' Box and Signal Poles



Delegates to the International Touring Parliament in Session at the Ministry of Foreign Affairs, Paris

NINE COUNTRIES AGREE TO UNIFORM TOURING REGULATIONS

PARIS, Oct. 20—The United States possessing varied automobile laws and regulations, was unable to take an active part in the international parliament held in Paris recently for the purpose of unifying regulations governing auto traffic throughout the world. This inability created considerable comment.

The net outcome of the meeting is that nine nations: France, Germany, Italy, Belgium, Bulgaria, Roumania, Montenegro, Servia, and the Principality of Monaco have signed an agreement which will materially simplify international automobile touring. In order that a car of any one of these nations may be allowed to enter free and without formality into any of the nine countries, all that is necessary is that it shall obtain an international road certificate from its home authorities.

What the Certificate Requires

The certificate, which is good for one year from date of issue, is issued for both car and driver on the fulfilment of certain requirements. The machine must be up to a certain standard, which is practically that of the Service des Mines in France, the points of which are safety from fire and explosion, effective steering, two independent sets of brakes, and simplicity of control. The driver must not be less than eighteen years of age, and must give proof of his ability to handle a car in a safe manner to the satisfaction of the examining authorities.

With driver and car up to standard, the automobilist may go forth into any or all of these nine countries without any other driving license or the necessity for any other registration number than that issued by his own country. The move is an important one, and will be specially appreciated by those visiting France, Germany, Belgium, and Italy, which are the most extensively toured countries in Europe.

England and America Not Included

It will be noted that England, in addition to America, has failed to join the international group. English regulations are very similar to those of America: any car can be put on the road providing taxation is paid, and any man can have a driving license on making application for it and paying the necessary fee. To come into line with the others it would have been necessary to institute an examination of cars, with a special registration other than that for taxation purposes, and further it would have been necessary to establish an examination for drivers with an accompanying registration, as is now done in France, Germany and other countries. The English delegates, evidently, could not guarantee that their government would do this, and were consequently unable to sign. There is a possibility of Great Britain coming into line at a later date. In fact, it approaches a certainty.

Pass to the Right and Keep to the Left

A proposal was brought before the congress that a universal rule of the road should be adopted, all vehicles keeping to the left and passing on the right, as is done in England and certain portions of Continental Europe. The disturbance that would be caused by such a change prevented it being adopted, but it was significant that the proposal gained much favor among delegates of countries where the American rule of the road is in vogue, and that M. Millerand, minister of public works in France, expressed the opinion that later the whole world would have to come to the English method.

Among the other matters agreed to by the international conference was that no automobile should be permitted to travel in foreign countries allowing the use of its national registration tag unless in addition the cars carried special plates with letters indicative of the country of their origin.

Signals That Find Most Favor

A loud sounding horn was agreed upon as the proper signal to be used by an automobile, with mechanical hooters allowed in the open country. At nightfall every automobile must carry two lights in front and one at the rear. Dazzling headlights must not be used in towns.

A few modifications were made for the benefit of motorcyclists, the rear light being considered unnecessary, the size of registration numbers could be reduced and a reverse gear was not required.

All the governments signing the agreement resolved that in their countries a uniform system of road signs would be employed. These will be the four signs recently adopted by the international road congress in Paris, and originated by the Automobile Club of France. The warning is given by means of a figure, without any wording whatever. In addition to these four it was allowed to add a fifth not included in this series, to indicate a customs office or frontier station.

It is certain that this first conference will not be the last. The high standing of the delegates sent by the respective governments is an indication of the importance attached to the proceedings. The desire not only among automobilists but in official circles is to make automobile laws and regulations uniform throughout Europe, so that international touring may be as free from formalities as travel in the native land.

Up-to-Date Features of Radiators and Pumps

Part 2

By Thos. J. Fay

GEAR pumps have other characteristics and fortunately a series of tests were made at the Thomas plant at the time of making tests of centrifugal types, and since this is an assurance of equality of conditions, the gear-pump tests will be of greater value than would be possible were there chances of changing conditions. Fig. 11 represents the performance of the type of gear pump used on one of the 1909 Thomas models and the water in gallons per minute was in direct proportion to speed, thus showing that the pump was well made and that leakage was not a factor within the limits. The horsepower exerted was found nearly parallel to increase in head beyond 600 revolutions per minute and to increase at a rate in excess of the increase in capacity of the pump with increasing speed; the pump performance in view of the results differs but little from that of the centrifugal-pump test, in that the amount of water moved at speeds below 600 revolutions per minute is below the desired point and the increase is in direct proportion to speed. In the centrifugal pump the increase is a little more than in direct proportion to speed, but is nothing like what is usually supposed.

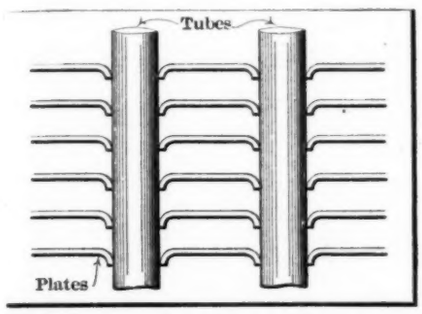


Fig. 7—Section showing how the gill-plates are flarged over tubes to increase surface of contact with tubes

As between the two types of pumps there is little or no choice; they both do the work under substantially the same conditions unless it is that the gear type of pump is more likely to make noise. When it comes to wear it is difficult to make any comparison at all for the reason that design features are likely to obscure the results so that a comparison will be futile. There is ample reason to believe that both types of pump last as long as the motor when they are properly designed and built. In conclusion of this phase of the subject it is just possible that Fig. 12 presents the efficiency of the gear type of pump and will add a desirable increment to the knowledge in store for future guidance of designers.

Pump and Radiator Must Be in Harmony—It is useless to employ a pump of large capacity unless the radiator is capable of abstracting all the heat that is taken from the motor. On the other hand, since the radiator should be large enough to do the required work, it is self-evident that the pump should move as much water as the radiator can handle and sponge all the heat units out of it that come from the motor. If the pump is sufficient in capacity the radiator will have to be larger for a given work assuming that steaming is to be avoided. It cannot be shown readily that there is much danger in adopting a pump that is too large, and in selecting a pump for this work, considering the small amount of power consumed in moving the water, it would seem to be the better choice to have the pump a little large for the work. The probabilities are that it is desirable to use a pump that will move 1.33 pounds of water per horsepower per minute when the motor is running at about 400 revolutions per minute. This is but approximation to be sure, but it is so near the requirement (on the safe side) that it is a better guess than to risk a restricted capacity of the pump and have to use a large radiator or put up with steaming.

Comparing the Thermo-Syphon System—The old idea of the thermo-syphon system of cooling was that it was the "system of natural circulation," which is true, perhaps, under certain well-defined conditions. In the radiator, as shown in Fig. 3, the circulation is far greater than that due to the natural difference in weight of heated and cooled water. In order to bring out the point to be made it will be necessary to present a sectional drawing of the radiator which was kindly furnished by the Regal Motor Car Company and is here given as Fig. 13. The water enters at a point near the top of the radiator from the motor (see section A) and is impelled by energy from steam which forms over the domes of the cylinders. When the water and entrained steam enter the pocket some of it passes up to the space b and the balance down to the lower chamber c. The water that passes up to the chamber b, together with the entrained steam, is reduced in temperature during its passage and it then passes down through the outside rows of tubes d. In its downward migration it is cooled more perfectly and is there mingled with the heated water which passes down directly from the pocket a to the chamber c. The cooled water passes along the pipe e back to the water jackets of the cylinders of the motor, thus completing the cycle.

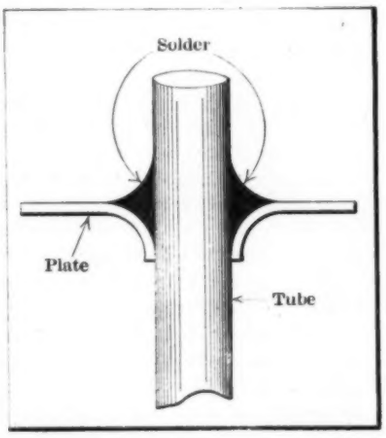


Fig. 8—Illustrating the way the solder runs down and forms a fillet at junction of tubes and plates, thus increasing conductivity

In this is evidence of the equivalent of a pump, it being the idea to utilize the energy in the steam. That steam does form over the surfaces of the water jacket is now a well-established fact and all that remained was to so contrive a radiator that advantage could be taken of this available energy. Of course, this system is thermo-syphon in name only, and while it matters very little as to the designation, even so, it more properly belongs to the "injector" family.

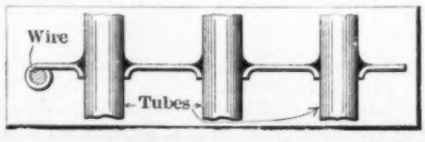


Fig. 9—Section depicting the wire binder in the plates to make them rigid and to enhance appearance

The true thermo-syphon radiator would be the same as shown in Fig. 2 were the pump omitted. In other

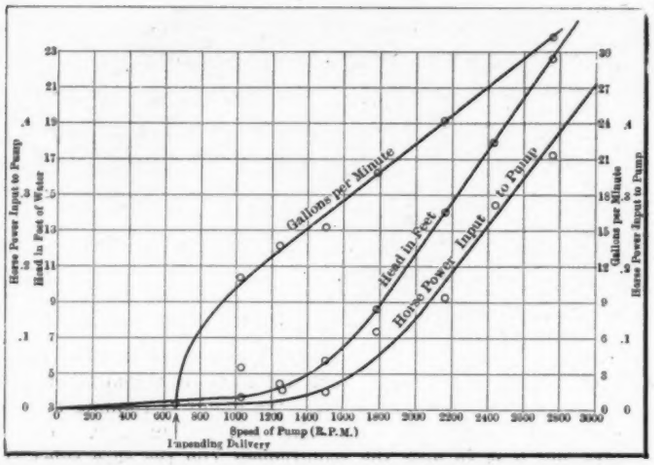


Fig. 10—Test of centrifugal pump used for water circulation by the Thomas Motor Company

words, there is only two differences between radiators as used with a pump and when used without a pump—a, the radiator must be larger and advantageously placed if the pump is not used, and b, the piping system must be more commodious, so as to accomplish the desired results.

Determine the Ratio of Surfaces—After all the great question beyond an efficient radiator is to determine the ratio of flame-swept to radiating surface, and while this ratio will not be the same for thermo-syphon systems as it must be when an enforced circulation is taken advantage of, it should be ascertained with much certainty unless it is that the radiator can be fixed upon by trial of a number until the right size is found. By determining the exact flame-swept surface all the uncertainties are reduced to a minimum and dealing in horsepower rating becomes unnecessary. If account is taken of the wide disagreement between engineers when it comes to determining actual horsepower of the several makes of motors, it is easy enough to see that any such method of determining as to the required capacity of radiators is quite out of the question. Each case must be considered separately and the amount of power given full consideration.

In a general way it is possible to say that the limits of the ratio of radiating to flame-swept surface of cylinders will lie between one and two. In certain cases the situation was found to be as follows:

CASE "A"

Radiating surface (exterior of cylinder).....298 square inches
Flame-swept surface of cylinders.....168 square inches

$$\text{Ratio} = \frac{298}{168} = 1.78$$

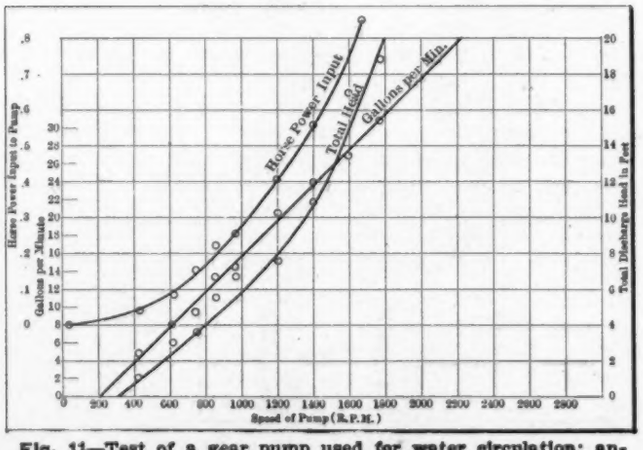


Fig. 11—Test of a gear pump used for water circulation; another Thomas undertaking

CASE "B"

Radiating surface (exterior of cylinder).....464 square inches
Flame-swept surface of cylinders.....273 square inches

$$\text{Ratio} = \frac{464}{273} = 1.70$$

In the above it is understood that the radiating surface of cylinders is that (covered with circulating water) outside and facing the flame-swept surface with the cylinder wall between.

The relation of radiating surface of radiators to radiating surface of cylinders will depend upon the effectiveness of the later and the efficiency of the former. If the radiator is efficient it is possible to realize good results with thirty-three times the cylinder radiating surface. If the radiator lacks in efficiency it may be necessary to increase to even 45 square inches of radiating surface per square inch of cylinder radiating surface.

What the Situation Portrays—The story, if it tells anything, rather goes to show that accessories (in the form of complete units) may be made by specialist quite as well, if not better, than in any other way. To bring about the best results, however, it is desirable to do the work in shops that are especially fitted out for the purpose and cost should be second to quality. This is not to infer that cost, if it is high, is a guarantee of quality;

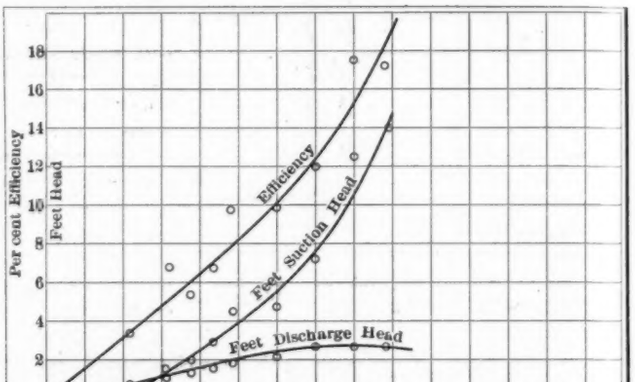


Fig. 12—Curve of efficiency of a gear pump used for water circulation as determined in the Thomas laboratory

on the contrary, the very increase in cost, if it is brought about by doing things in a bungling way, is a sign of absence of quality.

Referring to radiators in accessory shops, it is certain that a thorough investigation of the motor to be cooled is an absolute necessity and, as before stated, the flame-swept surface must be carefully determined. But this is not all; the compression must be taken into account on the ground that the temperature prevailing will not be the same for all compressions. Then, the timing is of importance, for, if the hot gases are retained for a lengthened period more heat will be absorbed by the jacket water, and as this heat is increased, so must the surface of the radiator be augmented, and this, too, in excess of the radiator surface which would be indicated by counting the area of flame-swept surface.

There is no reason why the timing question should complicate the situation very much, since it is possible to time all motors in such a way as to realize the best results, but there is but one way to prevent motorists from running on a retarded spark, and that is to so design the ignition system that the spark will be fixed. True, a fixed spark does not give the highest attainable results, but it does afford higher values than are usually attained by the average driver of a car. At all events, it is futile to charge the raditor with lack of ability if the motorist persists in running on a retarded spark, and this point should be explained to every motorist when he purchases a car.

EFFICIENCY TEST OF McCORD RADIATOR

HEIGHT, 28.5"; WIDTH, 25"; THICKNESS, 3.25"; WEIGHT, 60 POUNDS. MADE UP OF 144 VERTICAL WATER TUBES ¼" DIAMETER

Time in Mins.	R. P. M. of Motor	Pounds on Scale	Temperature F.				
			Water		Air		
			To Radiator	From Radiator	To Fan	From Fan	In Room
00	1000	20.00	160.00	152.00	90.25	95	86.0
05	1000	20.00	181.00	172.00	91.75	99	87.8
10	1000	19.75	189.00	180.00	91.75	100	88.5
15	1000	20.00	193.00	184.00	91.75	102	89.0
20	1000	19.75	195.00	185.00	91.75	109	89.6
25	1000	20.00	197.00	187.00	92.50	104	90.3
30	1000	20.00	198.00	188.00	92.50	104	90.3
35	1000	20.00	197.00	187.00	92.50	103	89.9
40	1000	20.00	197.00	187.00	95.50	103	90.1
45	1000	20.00	197.25	187.25	92.50	102	90.1
50	1000	20.00	197.00	187.25	92.50	102	89.6
55	1000	20.00	197.00	187.25	93.25	104	89.6
60	1000	20.00	197.00	187.00	91.75	102	90.5
65	1000	30.00	207.00	196.00	94.00	105	91.0
70	1000	30.00	211.00	201.50	96.25	107	92.5
71	1000	30.00	212.00	202.00	96.25	107	92.8

Note.—144 pounds of jacket water per minute.

The test as above given was made by one of the makers of cars to ascertain as to the ability of the radiators of this make, and the excellent results realized sufficiently voices the situation to render further discussion along this line wholly unnecessary. The table shows, among other points of interest, that it took 25 minutes before the water reached a constant temperature, after which the radiator abstracted 1,431.4 B. T. U. of heat from the jacket water, with a difference in the water between inlet and outlet of 9.94 degrees Fahrenheit, working between the limits of 197 and 187 degrees Fahrenheit. The amount of water circulated was (as given in the table) 144 pounds. Since the temperature did not reach the maximum allowable in practice (the boiling point of water) it is a fair inference that the capacity of this radiator can be taken as about equal to 1,500 B. T. U. (British thermal units of heat) under the conditions of this test, considering round numbers.

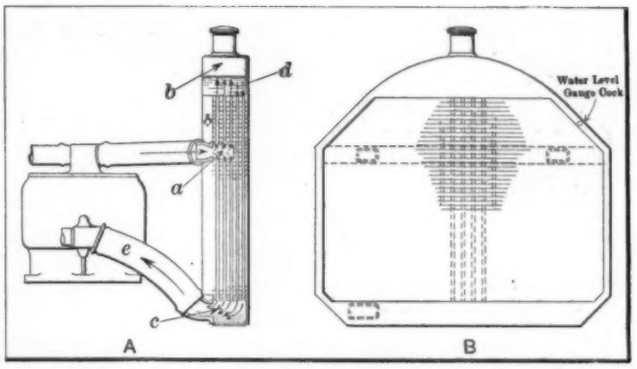


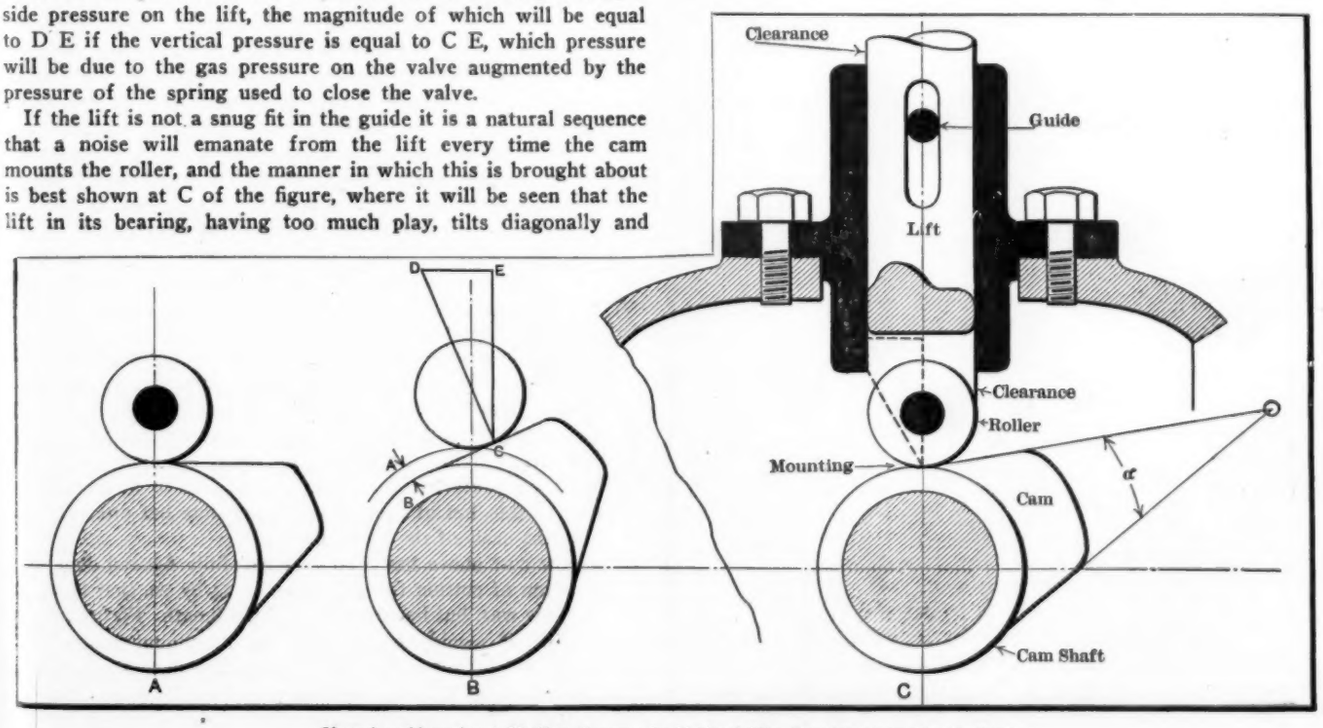
Fig. 13—Section of a Regal radiator offered to show how the water is directed under the force of steam

NOISE EMANATES FROM THE VALVE LIFTS

DIFFICULTY is frequently experienced in locating noises in and about the power plant, probably because there are so many of them that it is difficult in determining where to begin. The best way, perhaps, is to go about it in a systematic manner, starting with the most likely sources, as in the valve lifts, since in them the cause of the noise is of a mysterious nature. Referring to the accompanying figure. A depicts the lift-roller on the vertical center line just before the roller begins to mount the cam, and at B the roller has mounted the cam by an amount represented by the radial distance A B, thus bringing the roller where it contacts with the Cam at C and the line C D is at 90 degrees with the face of the cam, which brings the line C E out of the true plane of lifting by an amount equal to D E, but since C E is parallel to the lift, it follows that there will be a side pressure on the lift, the magnitude of which will be equal to D E if the vertical pressure is equal to C E, which pressure will be due to the gas pressure on the valve augmented by the pressure of the spring used to close the valve.

If the lift is not a snug fit in the guide it is a natural sequence that a noise will emanate from the lift every time the cam mounts the roller, and the manner in which this is brought about is best shown at C of the figure, where it will be seen that the lift in its bearing, having too much play, tilts diagonally and clearance is indicated at the two diagonal points effected. There is no take-up provided for valve-lift guides, and in order that they will not become noisy it is good practice to lubricate them, particularly in view of the manner in which the pressure comes on when the roller mounts the cam, for if play is engendered noise will follow and the only cure is to procure new parts.

The amount of noise which will follow if the lift becomes loose in the guide depends very largely upon the shape of the cam, diameter of the roller and length of the guide. If the motor has a plurality of cylinders the same trouble will be experienced with each cylinder and something of a clatter may be the due reward of allowing the guides to run without oil and with sand or other foreign substances present.

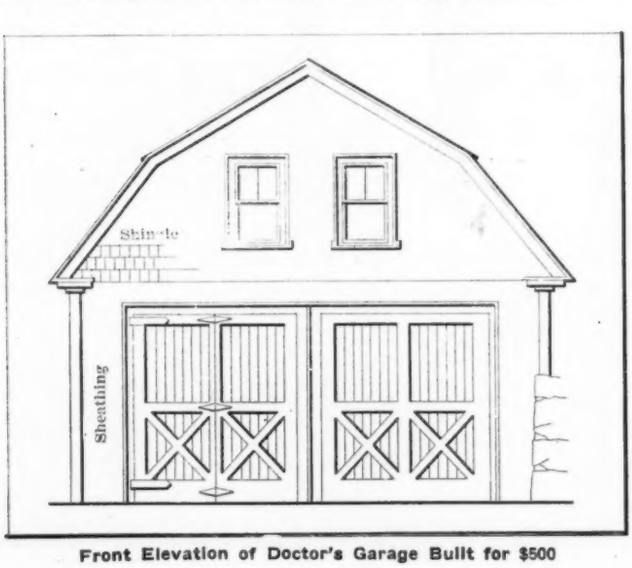


Showing How Lost Motion Creeps In If the Lifts Are Slack in the Guides

Of All Materials, Concrete Meets with the Most Favor—Two Types of Concrete Garages, One Small, One Large

ONE of the most important reasons why the cost of garages may not be analyzed in detail is because costs are not available. In many cases the cost so overlaps the original estimate upon the basis of which the construction was started that the builder is ashamed to give out the figures. Another reason is that the man starts in to build a very modest structure, to cost very little. The addition of this feature and that feature so adds to the size or scope that extension is necessary, and again the cost is exceeded. In many cases the owner and amateur builder forgot some very important part in the original plans, necessitating redrawing the plans and altering the building. This, through shame or otherwise, causes the cost to be suppressed. Then others withhold figures on the assumption that it is no one's business but their own. This mistaken notion has done much to hold back the universal construction of the ever-necessary private motor house or garage.

Some few costs are available, and these will be given, preparatory to taking up the subject of the various forms of construction. Thus, the small frame garage shown elsewhere on this page was built from the design of a Massachusetts doctor, who also let the job out by the day and superintended the construction himself. This would require an amount of time which the ordinary man could not give to it, and in considering the figures this should be taken into account. The reason why this must be considered is that, with all due respect for the ordinary laborer and other workmen, more work is obtained in any given time through personal supervision than in any other way.



Front Elevation of Doctor's Garage Built for $500

Garage Large Enough for Two Cars—Less Than $500—So, in thinking over the figures and applying them to your own case, if you cannot oversee the job yourself, add something to the cost as given. This garage was intended for but one car, although it was made very large, 20 by 28, which again influences the cost through the amount of material needed. In addition to the large size of the house, a very large cement washing platform was built outside of the house, in front of it, in fact, and upon this all washing was done, in fair weather at least. This also added to the cost. The material and cost was as follows:

Material or Work	Cost
Lumber and Carpenter	$398.63
Foundation	12.00
Blinds	6.60
Drain Pipe and Hardware	8.90
Sink Piping and Work	14.87
Cement and Laying	16.50
Painting Foundation, etc	7.50
Painting (Estimated)	25.00
Total Cost of Garage	$490.00

An inspection of these figures shows that the largest item of all is lumber and labor of erecting the same, this amounting to over 81 per cent. of the total. From this it is apparent that if the cost is to be reduced materially the size of the house must be cut down. The cement washing stand in front of the structure could not have influenced the cost to any great extent, as even considering it to have an area equal to that of the interior, so as to be equivalent to half of the whole cement work, eliminating the same would only halve the cost, or take away $8.25. It would appear, upon giving the matter a little thought, that the above assumptions could not hold true, so that the most that one might save in this direction would probably be $7. Again, one might say that blinds were unnecessary in a garage, but cutting them out reduces the cost by only $6.60, which, added to the other saving, totals but $13.60. As this is but 2.5 per cent. of the total, we are forced to repeat the first statement, that to reduce the cost of this garage it will be necessary to reduce its size, the saving as per blinds and cement platform being less, much less, than those two features are worth.

As was stated, this garage is plenty large enough for two cars, and a person liking the layout, but being economically inclined, either from preference or choice, might like to figure what one similar to this, but of a size to accommodate but one car, would cost on the basis of the above figures.

So, the cost above has been very carefully figured over on the assumption of cutting the size down to 14 by 20, that is, as wide as this one was, but having only half the length. Figured over on that basis, it would appear as if the maximum amount to be saved would be about $150, which would reduce the whole cost as above to $340.

This, then, forces one to the conclusion that a garage to be low

in price must be very small, and as near to the size of the car as is possible. This is a conclusion which is not very pleasant, and so it is a source of gratification to be able to give some figures on another garage, in the construction of which space was used freely, resulting in a very large garage, even larger than the one just described. Despite this fact, the whole cost was less.

What One Doctor Accomplished—As shown on this page, it is rather spread out, but, as will be explained later on, this was due more to its method of construction than anything else. Like the first, it is located in Massachusetts, and, like the first, also, much of the work was done under the supervision of the owner. More than that, the rest of the work he did himself at odd times. In this way the construction was extended over a long period of time. To offset this, the money saved was very considerable, and the work itself was well worth while, as it provided both exercise and recreation. Moreover, as will be brought out later on, this method of construction allowed the addition of numerous little conveniences which cost but the price of a plank and a few nails, practically nothing. But with a carpenter doing the work, even these very small items assume a large proportion, and figure prominently in the final cost.

The resulting garage incorporates two old buildings, an old carriage house at the left (upon which are placed the reference letters A, T, J, J, S, K and G), as well as a hen house and hen yard (lettered M and L, respectively). To the right of the old barn was built a lean-to, which added 286 feet of floor space, being 26 feet long by 11 feet wide. The size of the original carriage shed was 15 feet wide by 26 feet long and 9 feet high. This gave a floor space of 390 square feet, the total being just under 680 square feet. Some of the costs are approximate, as they were made up afterwards from memory, but in the main the figures are reliable. The whole cost was divided as follows:

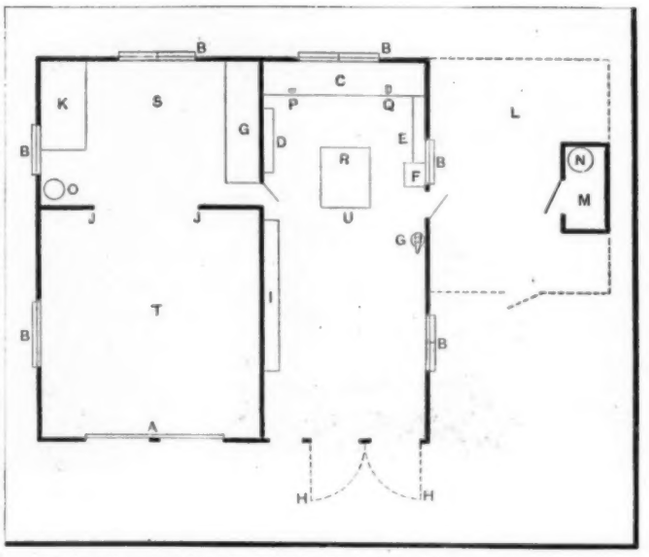
Material Only	Cost
Original Shed	$100.00
Cement Floor for same	30.00
Lean-to, Including Cement Floor	110.00
Partitions, Benches, Lockers, Shelves, Pit, Etc..	25.00
Hot Water Heating, Incidentals	26.00
Total Cost	$290.00

Since the details are of more interest than the exterior features or the plain facts of cost, it will be well to describe the whole interior arrangement, referring to the letters on the floor plan. The letter A at the front represents a pair of rolling doors, one rolling past the other. This arrangement, coupled with the size of the doors themselves, gives easy access to the room, and plenty of light to work there once the car is inside. The interior lighting is much improved by the two large windows B, B, facing the south. One of the doors carries a large pane of glass (it could hardly be called a window), which adds to the interior light when it is necessary, owing to weather conditions, to keep the big doors closed. T is the space where the car stands normally, and this is separated from the space S back of it by means of the rolling doors J, J. These make the space S into another room and add to the convenience in many ways. This latter is a sort of living room, in that it has a bunk, K, in the corner, which is used by the chauffeur who may be kept waiting for a long time, or upon other occasions. This is not stationary in the ordinary sense of the word, but may be folded up against the wall and out of the way when not in use.

As located, it is close to the hot water heater, O, which furnishes the heat for the whole structure, pipes running through into the lean-to and heating that. The size of the heater was carefully selected so as to use the smallest one that would heat the two buildings comfortably. In this way the fuel consumption is kept low.

That this room is not a resting place pure and simple is shown by the presence of the anvil, G, in the opposite corner. This is very handy for straightening out bent parts, as well as doing small and simple forging jobs. In the latter case, the heater is used as a fire, so the usual smith's fire is not necessary.

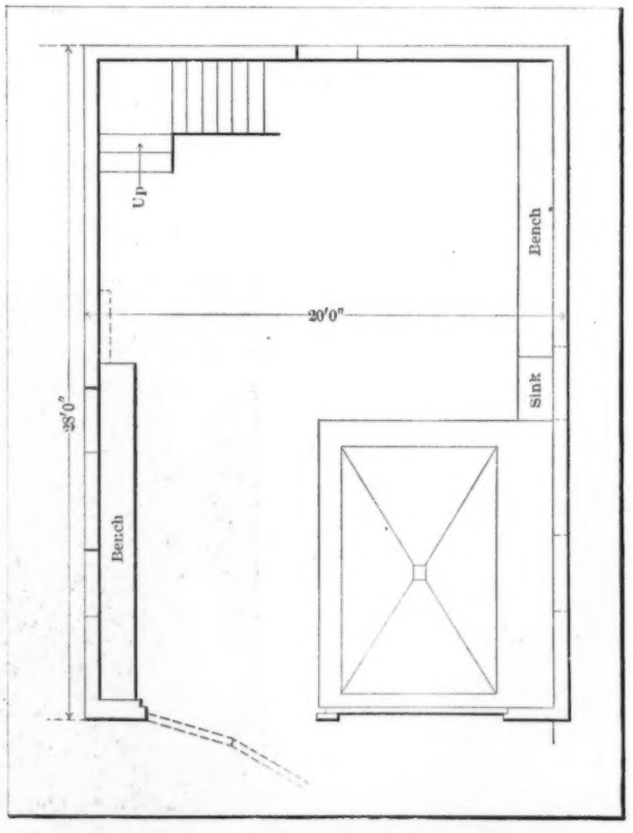
L represents the space formerly occupied by the hen yard, and M the hen house. The latter has been converted into a



Another Doctor Built This From an Old Barn for $300

gasoline storage shed by the simple process of cleaning it out, and installing a large tank. This has a capacity of 100 gallons, and by buying the fuel in such large quantities a rather noticeable saving is effected, so that the old hen house serves a double purpose. This tank has a faucet which can only be opened by means of a key, while the house itself is always kept locked. Beyond these two precautions the house is enclosed by a five-foot fence, so that to get into it and get gasoline would be quite a task, more so than the value of the fuel would warrant.

No Danger from Fuel Being Near Fire—To insure that the gasoline never approaches the fire very closely, the room in which the latter is located is so constructed as to be shut off from the other room, U, into which the fuel might be brought. R is a pit 3 feet wide, 4 feet long and 3 1-2 feet deep, with brick walls



Plan of Garage Shown on Page 720. Note Washing Platform

Concrete Garage Built in Connection with a Large Residence

and cement floors. In stocking the whole house the owner was not sure that he would be able to do much of any repair work himself, so did not get any tools, but as time progressed and he found time, inclination and ability to make his own repairs, he made a practice of noting down a particular tool which would be useful. Then, upon the next trip to town (some distance away), this tool was purchased. In that way a large stock of useful tools was accumulated without incurring any large immediate expense. Strictly aside from the expense, only the tools known to be of immediate use were purchased, and no money was wasted.

Carrying the greatest weight in the whole erection of the building, its outfitting and subsequent use was the idea of getting all that was possible out of every dollar expended. The owner's personal ideas relative to the private garage are best expressed in his own words. He says, in part:

"During the past five years my garage has more than paid for itself by saving me large sums in repair bills. You have a place to do the work, and the supplies are on hand, so that you attend to your repairs as soon as needed rather than wait until a larger expenditure is needed. You have no storage bills; you pay the repair man for actual time spent on your work, rather than paying for all the time the car is in the shop, whether they are working on it or not (this the writer had to do before he built his garage). Cars are handled much more carefully in a private garage than in a public one, and there is no chance of things being stolen. Tools can be bought as you find you need them, and in that way you will get just what you need, and buying them a few at a time will not feel the cost."

Very Marked Influence of Size of Car—It is immediately apparent from a consideration of the above figures of actual buildings that the size of the car exerts a large influence upon the cost of the garage. Since the wheelbase of the car determines the length of the whole car, it will be interesting to look into the matter of wheelbases and overall lengths.

Data on this subject is very scarce, as the extreme overall dimension is one that is seldom required except in shipping a car, so that this is not very often measured. One of the leading manufacturers compiled such a table several years ago. This only includes the cars built by this firm, but it must be taken as an average value. Moreover, in the scarcity of similar figures, even this has value, for the heights and lengths with top are given.

Table Showing Principal Dimensions of Typical Modern Cars

H.P.	Type	Remarks	Wheelbase Ft.	Wheelbase In.	Length Ft.	Length In.	Width Ft.	Width In.	Height Ft.	Height In.
14-16	side entrance		8	4	12	6	5	2	5	3
14-16	side entrance	(hood up)	8	4	12	6	5	2	7	5
14-16	side entrance	(hood folded)	8	4	13	6	5	2	5	6
14-16	single landaulette		9	0	13	0	5	2	7	0
14-16	limousine		9	0	13	0	5	2	7	0
14-16	city carriage		6	10	10	8	5	5	7	4
16-20	side entrance		9	0	13	0	5	3	5	5
16-20	side entrance	(hood up)	9	0	13	0	5	3	7	7
16-20	side entrance	(hood folded)	9	0	14	0	5	3	5	8
16-20	seven-seater side entrance		9	9	13	10	5	3	5	5
16-20	three-quarter landaulette		9	9	13	10	5	3	7	7
16-20	limousine		9	9	13	10	5	3	7	7
26-30	side entrance		9	3	13	4	5	7	5	5
26-30	side entrance	(hood up)	9	3	13	4	5	7	7	7
26-30	side entrance	(hood folded)	9	3	14	4	5	7	5	8
26-30	three-quarter landaulette		10	0	14	1	5	5	7	8
26-30	limousine		10	0	14	1	5	7	7	8
40	side entrance		9	8	13	8	6	0	5	6
40	side entrance	(hood up)	9	8	13	8	6	0	7	8
40	side entrance	(hood folded)	9	8	14	8	6	0	5	9
40	seven-seater side entrance		10	4	14	4	6	0	5	6
40	three-quarter landaulette		10	4	14	4	6	0	7	8
40	limousine		10	4	14	4	6	0	7	8

N.B.—In some cases the lamps mean a further increase in length.

From these figures it is possible to deduce the fact that the average additive quantity which the car projects beyond the centers of the wheels is 4 feet 4 1-2 inches. Taking this at 4 feet 6 inches, it is possible to compute the overall length of any car.

As throwing some light upon the garage problem in an indirect way the table given in THE AUTOMOBILE last winter in connection with the New York show issue has been gone over. From this the average wheelbase in each class has been figured.

For the cars classified between $1,000 and less, 17 different ones average 91-inch, or 7-feet 7-inch wheelbase. In the next class, $1,000 to $1,500, the wheelbase averaged from 19 cars increases to 106 inch, or 8 feet 10 inches. In the $1,500 class, that is from that figure up to $2,000, the average of 24 cars yielded a result of 110 inches or 9 feet 2 inches. Continuing the steady increase, the class of cars selling at from $2,000 to $3,000 yields the figure 114 inches, or 9 feet 6 inches. In the next class, $3,000 up to $4,000, a total of 26 cars averaged 118 inches, or 9 feet 10 inches. The $4,000 to $5,000 class yields a length of 124 inches, or 10 feet 4 inches. In the $5,000 upward division, 128 inches, or 10 feet 8 inches, result. Applying to these the additive quantity, namely 4 feet 6 inches, the overall length for these averages becomes: $1,000 and less class, 12 feet 1 inch; $1,000 to $1,500, 13 feet 4 inches; $1,500 to $2,000, 13 feet 8 inches; $2,000 to $3,000, 14 feet; $3,000 to $4,000, 14 feet 4 inches; $4,000 to $5,000, 14 feet 10 inches; above $5,000 15 feet 2 inches.

In applying these figures to the design or construction of a motor house or private garage, the owner of the car should add to the overall car size such an amount as his personality and attitude toward the economy question would dictate.

(To be Continued.)

Suburban Lots Allow Floral Effects Which Enhance Appearance of Frame Garages

How The Power of an Old Engine was Increased

By Oliver Light

FROM the first crude internal combustion engine, developed by Gottlieb Daimler nearly a quarter of a century ago, to the present, efficient, and highly specialized form, has been a huge advance, marked by slow and very gradual steps.

The principles entering into the consideration of the design and construction of the efficient motor were not as well known to early engineers as they are at present, and, as a result, their productions, while practical and efficient for the time, make but a poor showing when compared to our modern forms. It was found by early designers that theory was one thing and its practical application another, and in many cases it was difficult to reconcile them in practice or to explain the results obtained. In contrast, at the present time, the general principles which govern design (thanks to the information presented in the trade papers and more experience) are well understood by engineers, and many laymen have more than a rudimentary knowledge of the gas engine.

As an example of what may be accomplished by an intelligent application of principles, the writer proposes to describe a change which was made on an engine designed nearly a decade ago which change increased the power produced by 50 per cent more than previously obtained, this without any change in piston displacement and in a simple and practical manner.

Minor Details Held Old Motors Back—Many of the earlier motors when contrasted to present forms have not proved satisfactory because of some minor detail or part which had not been properly considered by the designer, and the point on which they most often erred was undoubtedly in valve proportions and location. Modern engineers have learned that valve placing and size have a material bearing upan the efficiency of the internal combustion motor. The fundamental consideration often overlooked is that the gas be admitted to the cylinder as quickly as possible. Also, after it is burnt, the inert products of combustion which can serve no useful purpose after the first expansion during the power producing stroke should be expelled promptly, and with minimum back pressure.

Back pressure results in the retention of useless gas in the cylinder which means that the quantity of fresh gas taken in will be reduced and its quality impaired by dilution with the non-combustible residue. Reduction of back pressure is important in all kinds of expansion engines, and on some the efficiency will be seriously impaired if there is any resistance to the prompt expulsion of the inert products of combustion. It is not only important that the cylinder be cleared promptly, but the fresh gas must be given every opportunity to fill it to full capacity.

Valve sizes have a material bearing upon the rotative speed of the engine, and recent experiments and racing experience has shown that some methods of valve placing enable the designer to use larger valves and give higher efficiency than do some other positions. While speed of rotation is an important factor in determining the power output of an internal combustion motor, it is not the only consideration nor the only advantage which large valves have over smaller ones. Prompt charging of the cylinder and rapid expulsion of the gas, made possible by the use of large valves, also results in increased flexibility and improves the "pulling" qualities at low speeds.

The writer has from the first held rigidly to certain tenets, one of these being that valves should be located directly in the head so that the opening would lead to the combustion chamber without pockets to retain heat or prevent free gas flow, another being that the valve diameter should be as near half the cylinder bore as the design would permit.

Description of Car and Engine Experimented Upon—An associate of the writer owns a small runabout of well-known make and somewhat ancient pattern, of which many thousands have been sold in past years. The motor employed is of the single cylinder type, 4 1-2 inches bore and 6 inches stroke. The cylinder head is a separate casting, being attached to the cylinder by means of studs, a packed joint insuring both the retention of compression and cooling water. The appearance and details of construction are clearly shown at Figs. 1, 2 and 3, and the sectional line view presented herewith, and will be easily recognized by automobile mechanics the world over, who will undoubtedly have fond(?) recollections of the difficulties met with in making a packing hold which would be both water and gas tight.

In this head, the valves are vertically disposed and actuated by peculiarly shaped rocker arms which in turn were lifted or depressed by the action of a cam upon the rollers at their outer ends. The valves were but 1 1-8 inches in diameter with about 3-8 inch lift, and the speed of such engine was low, rarely exceeding 850 revolutions per minute, at which they were rated at 4 1-2 horsepower. As will be evident, while eminently satisfactory at the time of their general production and sale, after several years development of multi-cylinder forms which have greater speed and hill climbing ability, their somewhat limited power in proportion to weight took away much of the pleasure of driving them. The low speed was often needed, even on minor gradients of barely ten per cent which other cars surmounted with ease.

While they lacked power, they were well made and have proved more than ordinarily enduring and capable of withstanding abuse and wear and tear of constant operation. Economical maintenance, simplicity of mechanism, and method of operation combined to make them very popular, and thousands were manufactured and sold at a very reasonable price. My friend, who is a mechanical engineer with some experience on gas engine work, was in every way satisfied with his car which had been remodelled and brought up to date in looks, at least, except that it lacked power, and, as must be evident, the little that was originally obtained when the engine was new did not augment with age and wear of components.

Experiments were made with the valve timing and some improvement was noted when a new cam, keeping the valves full open for a longer time, was fitted. Later, an accident made the replacement of the head necessary, and then opportunity was obtained to try an experiment which was interesting, and which improved the capacity of the engine almost beyond belief. In order that the change made may be followed intelligently by those who have not had experience with this make of car, a brief description of the old head and method of valve operation is necessary.

What the Old Cylinder Head Was Like—Fig. 1 shows a three-quarter view of the cylinder head, showing the exhaust valve and port, as well as the operating levers. Figs. 2 shows the inside or front of the head, making clear the limited port area leading into the cylinder from the combustion or valve chamber, also the small space between the stud holes and the inside flange, as well as the small amount of metal outside of the water passages, making it almost impossible to make a packing which would be enduring and satisfactory. The head was partly water-cooled in that the valve chamber was surrounded by water spaces. Fig. 3 shows a direct back view, making clear the placing of the valves and operating levers. The hole immediately under the exhaust valve lift is the cam shaft bearing, this shaft running along the side of the engine and parallel with it,

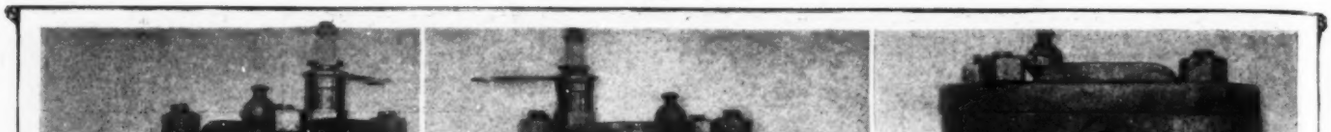


Fig. 1—Three-quarter view of old head Fig. 2—Front end, showing small passages Fig. 3—Another view of the old head

being driven from the crankshaft by a pair of exposed worm gears which gave the required reduction in speed.

In the exhaust valve seating a crack developed, a not uncommon occurrence with this form of engine design, in which part of the head was cooled by water, the remainder by air, probably owing to uneven cooling and poor distribution of metal. This opening penetrated the water space, and not only was the compression destroyed after the head had become slightly heated, but water was admitted to the cylinder as well. The effect of this upon engine efficiency can be imagined.

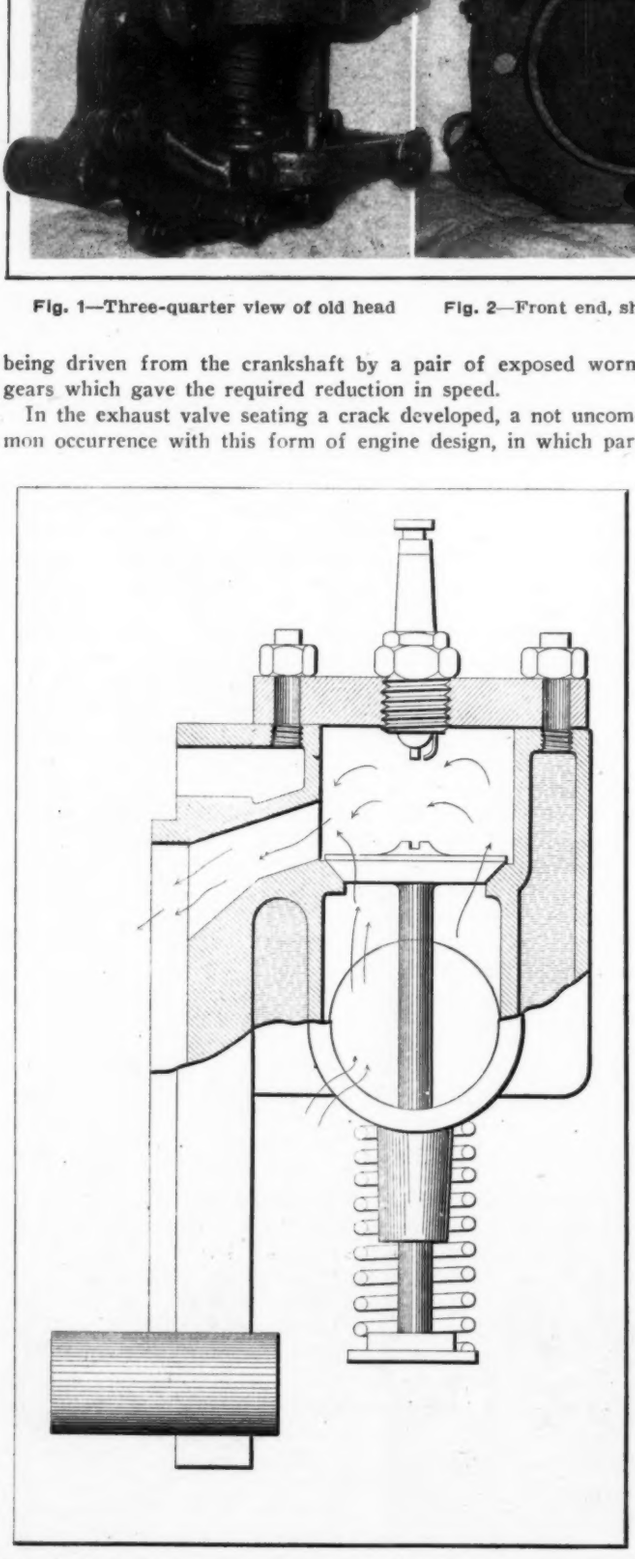


Fig. 4—Sectional arrangement of old cylinder head and passages

Upon investigation it was found that a new member would cost $25, and as restoration of the old head was not possible it was decided to scrap it, and instead of ordering a new component of similar design from a factory several thousand miles away, it was decided to try the effect of larger valves and more advantageous placing by designing a new head which would go in place of the old one without too much change. This was made possible by the detachable construction of the defective member.

Latent Possibilities of the Old Engine—As the writer had long been of the opinion that many of the old engines could be made more serviceable and efficient by refinement of detail or the incorporation of up-to-date features, and as this was shared by the owner of the car, a new type of head was evolved and applied to prove our pet theories. In designing this member, there were several considerations which made it necessary to proceed carefully. Among these low cost, simplicity and interchangeability with the old pattern were important considerations. A more efficient and doubtless more satisfactory construction could have been designed than the form finally selected, but it is doubtful if this could have been done without expensive alterations. In the first place, it was found that the cost of a water jacketed head pattern was more than one would feel justified in expending when it was considered that but one casting was to be made. Detachable valve cages and large valves involved machine work and more costly patterns, as well as making it difficult to operate the valves from the old camshaft.

After a number of forms had been proposed the type shown at Figs. 5, 6 and 7 was selected. As so large a part of the old member was not cooled by water, without any overheating having been manifest, and because of the greater simplicity and lower cost of the pattern, an air-cooled head was made in which the valves seated directly, the detachable construction making it easy to remove same should the valves need grinding. It was found that if the valves were placed at the top of the head, as shown, that there would be no difficulty in operating them, and no changes in muffler or intake piping would be necessary.

As will be seen, fairly large valves were employed, directly actuated in a manner that was simple and mechanical. The members were made 1 1-2 inch clear opening, the valves themselves being about 1 3-4 inches in diameter, of the conventional bevel seat type. The lift was 3-8 inch, as in the old head.

comparison between Figs. 4 and 8 will serve to show the difference in size of valves, as well as the improved method of charging the cylinder or allowing the old gas to escape. In the old head not only were the valves of insufficient diameter, but the gas flow was retarded by the devious passages through which they gained access to the cylinder or to the muffler, as the case might be.

Sharp Bends Reduced Amount of Charge, and Consequently, Power—Several sharp bends prevented prompt charging or expulsion, and except at low speeds it was difficult to properly fill or clear the cylinder. For this reason the motor was slow running, and developed but little power when in the best of condition. It will be evident from an inspection of the sketch of the old head that there was a large portion that was not water-jacketed.

In making the new head, it was thought that the better clearing of the cylinder because of the valve placing would make the use of a water jacket at this point unnecessary, and this has been borne out by practical experience with the new construction. The gas entrance is direct into the cylinder, there being but one bend or corner for the gas to flow around, either in coming into or going out of the cylinder. The irregularly shaped combustion chamber has been dispensed with, the inside of the head being clean and smooth, there being no sharp corners to retain the heat or cause trouble otherwise.

While the compression has been raised to some extent by cutting out the pocket, because of the better opportunity offered by the larger valves for prompt cylinder clearing, absolutely no difficulty has been met with in cooling. Runs of fifty miles have failed to heat up the head sufficiently to cause premature ignition. The head gets hot, as is natural, but does not attain a high enough temperature to show the slightest color when examined after a hard run at night. The exhaust pipe is red hot, but the exhaust valve chamber does not show that it is unduly heated. The inlet side of the head has not even become discolored, the valve chamber, which is not provided with flanges, not having heated enough to burn off the graphite paint with which the head was daubed after machining, and this after over 500 miles of running. The new member went right into place without trouble, the only change that was necessary was the removal of two short studs and the substitution of longer ones, because they passed through the valve chamber, the old ones not being long enough.

Fig. 5 is a three-quarter view of the new member, showing the method of valve placing, the flanges on the exhaust valve chamber, the bevel gears used to drive the short auxiliary camshaft carried on the cylinder head, and the bronze tappet levers or walking beams which actuate the valves. As will be evident, a large roller is fitted at the lower end of each tappet, this bearing

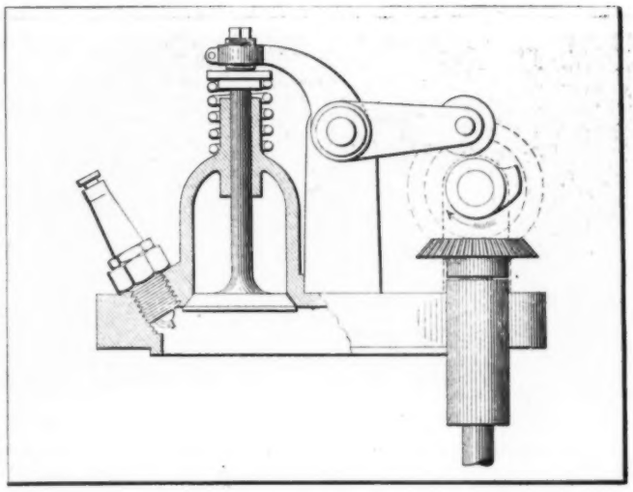


Fig. 8—Method of operation of new valves through rocker arms

directly upon the cam, carried by the short shaft. Threaded plugs are used at the upper end as a means of adjustment of clearance between the valve spring retaining collar at the end of the valve stem and the tappet.

The rocker arms are fulcrumed at the center, and operate upon a short stud supported by a suitable lug cast integral with the head. Fig. 6 shows the front or inside view of the new member, the valve to the left being the inlet, the other the exhaust, while the spark plug hole is shown directly above and between them. The spark plug placing is advantageous, as the spark takes place directly in the cylinder, which should be an improvement over the method employed in the old head, where the gas in the combustion chamber was first ignited, after which the charge in the cylinder was fired by the flame shooting through the port into the cylinder.

New Spark Plug Location Fires Charge Quicker—With the new method of placing, flame propogation is undoubtedly more rapid, and better results would be obtained at higher engine speeds than with the old method of igniting the charge. Objection may be made that the placing of the spark plug in an uncooled mass of metal would be extremely hard upon the insulation, but it should be remembered that even with the old head the spark plug was placed in an uncooled plate which served as a cover to the valve chamber, and but little trouble was experienced with it.

In the direct back view, Fig. 7, is shown clearly the design of the head. The auxiliary cam shaft is carried by a pair of lugs

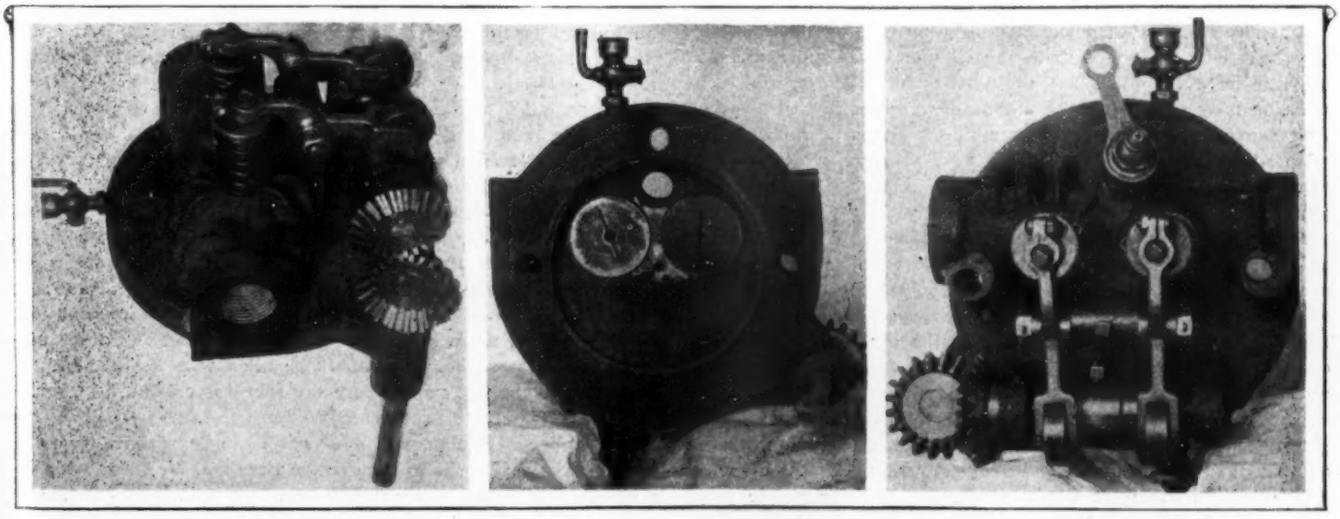


Fig. 5—Three-quarter view of new head Fig. 6—Inside showing size of valves Fig. 7—New head showing mechanism

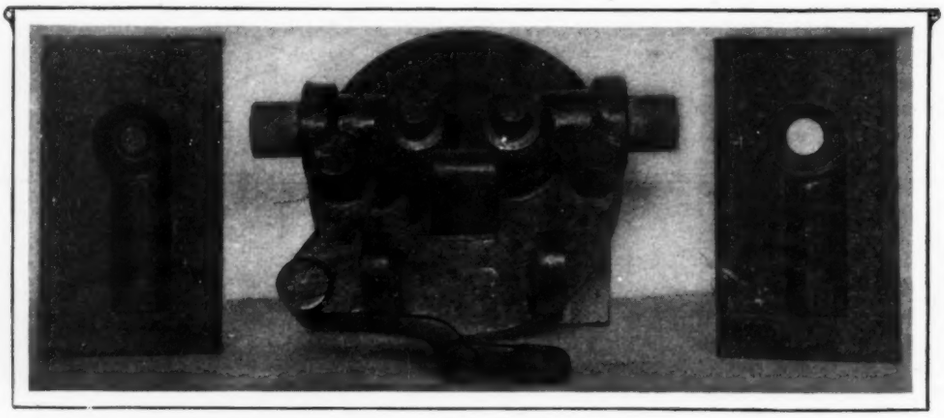


Fig. 9—Pattern of cylinder head and core boxes for valve cages used in making the change

which are bronze bushed and which are cast integral with the head, while the tappets or rocker arms are supported by a large bolt passing through a central lug. The spark plug placing and the valve chamber construction is clearly shown. At the top is placed a compression relief and priming cock, while at the bottom of the head a pet cock for draining out the accumulations of oil (which invariably collect in the bottom of the combustion chamber of a horizontal cylinder) is fitted. While in this view the cams are seen attached to the shaft by set screws, this was only temporary means of fastening during timing, they being permanently fastened by taper pins. In order to show the appearance of the head casting before machining, at Fig. 9 is shown the pattern from which the head was cast, as well as the halves of the core box for the valve chambers. The smaller pattern in the immediate foreground is that of the rocker arms, which for convenience were made bronze castings.

Through the use of the new head, the change in engine operation obtained is remarkable, and that power has been increased, admits of no controversy. The little car, which weighs over 1,100 pounds, and which is geared but a little over 3 to 1, will climb a 20 per cent grade on the high speed without a falter, pulling excellently at low speeds, and answering the throttle with a responsiveness usually associated only with multiple cylinder engines. The speed of the engine has been increased as well, and the car can speed well above the legal limit of 20 miles per hour.

Around the cylinder a water jacket is still used, and absolutely no trouble has resulted from overheating of the head. It was advanced by some before the change was made that the engine would never work satisfactorily under the conditions imposed by an air-cooled head because the valves would warp and fail to hold compression, and again, the head itself would become distorted by the high temperature to which it was subjected. While not as clean a piece of designing as the writer's associate is usually credited with, the distribution of metal was more uniform that the irregular outline of the head would indicate, and compression is as good after the engine has become heated as when first started, a little better if anything. The head answers the purpose and has served to make a very able car, which asks no odds of any other single cylinder, out of an old model which never had sufficient power even when new.

Amount of Power and Speed Increase—The larger valves and improved placing have made possible an increase of engine speed of 400 revolutions per minute, and the surmounting of a good 20 per cent grade on the high speed, which was not taken on the low any too easily with the old head, is evidence enough that the power has been increased by a substantial margin. This experiment has served to prove clearly that large valves, combined with a location directly over the piston will give one all the power that is possible to obtain by burning an amount of gas determined by the cubical contents of the cylinder.

The valve mechanism is not noisy, nor has any undue wear been noticed. The exhaust and inlet cams have been shaped so as to give a gradual opening, a long period of full opening and a rapid closing, and the original timing as determined by the flywheel marks has been adhered to. The exhaust valve opens about 40 degrees (crank travel) before the end of the expansion or power stroke and closes about 10 degrees past the top of the expulsion stroke. The inlet valve opens 20 degrees past the beginning of the suction stroke and closes about 15 degrees beyond the commencement of the compression stroke, or past dead center.

One trouble which the air-cooled head has entirely eliminated is the replacement of packings between the head and cylinder. As will be evident by referring to Fig. 6, a good bearing is obtained for a packing, there being plenty of metal between the edges of the stud holes and the head. The elimination of water passages has removed another weakness of the old design. In making a packing, a piece of well softened Mobiline was placed between two pieces of thin copper, about .005 thick, held together by turning in little lips which had been left on the inner and outer peripheries of one of the pieces when it was cut out of the sheet. This makes a packing which will hold compression with ease, and which serves to prevent water leaking from the cylinder jacket. The sheet packing is preserved because it is insulated from the direct heat and from the hot water flowing around the cylinder by the thin pieces of copper.

Various parts are easily reached, spark plug can be changed without trouble. The valve springs are out in the air and the temper of the springs is not lost as there is every opportunity for free air circulation around them. No change was made in piping, muffler or carbureter placing. The short auxiliary cam shaft and bevel driving gears are not liable to give trouble. Lubrication of components is not difficult, as a little graphite is mixed with the oil, which remains on the bearings after the head has become sufficiently hot to vaporize the fluid, and even the exhaust valve stem is coated with a thin film of graphite at all times. The valves have been made especially strong at the head, and no warping has been noticed or has grinding in the seatings been necessary, proving that there has been no distortion.

OPPORTUNE COLD WEATHER PRECAUTION

A large number of motorists who store their cars away for the winter do not take proper care of their tires. According to the Fisk Rubber Company, a good many tires are allowed to deteriorate in this way, and when the cars are put into commission again in the spring, the casings do not give the service that they should.

When a car is laid away for the cold months, the wheels should be jacked up and the tires deflated. It is essential that they should be kept in a place where no sunlight can penetrate; a cool dark place being preferable. The company advises owners of Fisk tires to examine their rims and cleanse them of any rust, which of course necessitates the removal of the tires, following which a little graphite should be applied to the rims before replacing the tires.

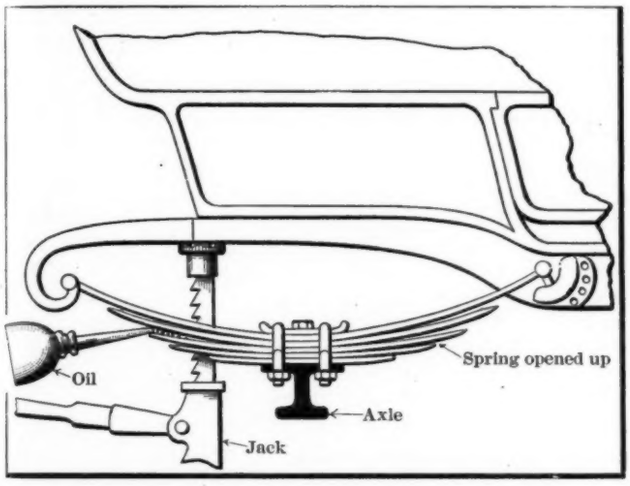
A little attention to spare casings and tubes before putting them away will mean added service in many cases. If there are any cuts in the shoes, they should be filled with a good cement and if there are any spots where the fabric is exposed, it should be seen to that these are perfectly dry.

By far the best plan, when the car is to be withdrawn completely from service, is to remove the tires and lay them away in a closet. They may to advantage be wrapped in burlaps. These precautions will insure their good condition in the spring.

GOOD SPRING ACTION DEPENDS UPON CARE

LIFE in springs will be prolonged if they are properly lubricated, since, *a*, rust will be aborted, and when springs are allowed to rust up the pitting which follows marks the point of failure, simply because the rust indentation has the same effect as a notch which is made in a test proof to make it fracture easier and to mark the point of rupture; *b*, real (desired) spring action will follow, and unequal strains will not take place. Take half-elliptic springs for illustration; they are made up of a plurality of flat leaves, each shorter than the other, all of the same width, and all given a bow so contrived that the extreme fiber strain will be the same in each plate when the spring is deformed under the load it is designed to carry.

The reasons for using several plates is to limit the extreme fiber strain, considering a given span of the plates, and a given action in the transverse plane, as well as to absorb energy and put a quietus on the motion of the body. It would be possible to use a spring made of one plate only were the same tapered from the center out in such a way as to afford such limber qualities as the word implies; the amount of energy the spring so made would absorb would depend upon the amount of molecular



Illustrating Method of Lubricating Plates of Spring

work engendered, and the spring would reach the end of its kinetic life the sooner simply because all the energy that could be absorbed would be in the form of molecular work.

Spring makers understand the necessity of long life, knowing full well that molecular work, unaided, would not represent enough loss of power, as it were, and they hit upon the happy expedient which resulted in the use of a laminæ of flat plates, each one shorter than the other, and all of them so thin that the extreme fiber strain would be limited to a safe point, taking into account kinetic life rather than rupture under the incidental load of the moment. In this scheme, in order to increase the power absorption, the plates are made to press against each other with a considerable force, and since in action there is relative motion of the plates, friction is set up between them.

The amount of friction see up depends upon the pressure on each unit of surface of the respective leaves, and, as will be readily understood, the plates must lay against each other at all points to afford the maximum result. This condition will obtain if all the plates are bowed to the same radius, irrespective of lengths, and pressure will then be considerable, while the extreme fiber strain will be the same in each plate, irrespective of the length, so that the kinetic life of the respective plates will be the same.

The amount of energy which can be dissipated by friction alone, which is the property to take advantage of, will be in direct proportion to pressure and the surface offered between pressing plates, and it follows that the greater the number of plates, the greater will be the energy dissipated. If a large number of plates are used, each one of them may be relatively thin, and the extreme fiber strain will then be a minimum, which is a guarantee of kinetic life and another way for saying the springs will last for a long time.

Lubrication Is Necessary to Engender Easy Action—When springs are properly made, the plates press on each other with sufficient force to cause them to seize, and the action will then be "fierce." At the instant of seizing the local strains set up in the fiber of the plates is enough to cause rupture in many cases, and the only way to abort this very undesired performance is to lubricate the spring, which to do requires that it be relieved of its load, when it will return to its open position in the manner as shown in the figure. If all the plates are bowed to a common radius, since each one is different in length from the other, the ends will open up just as the figure shows, and an oilcan may then be used to squirt oil on the plates forming the laminæ.

Since spring-plates are rolled with a concave surface, so that there is room for the oil between them, and in conformity with the behavior of the lubricating oil, it will tend to stay on the plates, rather than to be squeezed out, since it will flow to the center, away from high levels, when it is heated or put under pressure. An acid-free mineral oil, such as is used in cylinders of motors, is suitable for the purpose for reasons as follows: (a) It will not gum or evaporate; (b) it will not etch the material; (c) it will afford the requisite lubricating properties.

Long life, when flat plate springs are considered, would seem to be due to the use of very wide, thin plates, rather than relatively narrow, thick plates. Makers of springs sell them on a pound basis, and the thicker the plates, the lower will be the price, simply because the number of plates which will have to be handled per hundred-weight will be lowered as the thickness is increased. Matters of this sort, while they involve the commercial side of the situation, have to be taken into account when users of cars are trying to get all they can out of the springs. Retainers, if they are properly placed, will help out marvelously, especially if the plates are thick and a limited number of them are used. It might look as if lubrication is not desirable under such conditions, but it is only necessary to remember how fiercely a clutch will behave if the lubrication is awry, and how well the same clutch will pick up and hold its load when attention is given to the lubrication. It is the same problem; the clutch refuses to work properly when the metal contacts and seizes, and the springs act in precisely the same way.

PISTON VELOCITY IS NOT CONSTANT

The ratio of connecting rod length to stroke influences the velocity of the piston, and the following will hold:

Let,

l = eccentricity of crank (half the stroke).
L = length of connecting rod.
v = linear velocity of crank-pin.
Θ = crank angle.
S = piston velocity in feet per minute.
r = ratio

when,

$$r = \frac{l}{L}$$

and,

$$S = v\ (\sin \Theta \times l|2\ a \sin 2\ \Theta).$$

In the above expression for the piston velocity, all terms higher than $2\ \Theta$ are neglected because of their small value, which affects the result so little, and only makes the formula more and more cumbersome.

REPAIRING CYLINDERS

Editor THE AUTOMOBILE:

[2,065]—Is it possible to repair a small crack in the top of the water jacket of a horizontal cylinder (caused by freezing) by the use of some preparation made for that purpose? And if so, what is it, and where is it obtained?

Why are some cars made with only 55-inch tread? In such cases are not the tires chafed on the inside when driving over country roads?

Where is the Shawmut car, which participated in the New York to Paris race, made? W. N. HEDBACK.

Cumberland, Wis.

Cylinder cracks may be repaired by the use of several cast iron cements, these being applied in the form of a stiff paste. Without mentioning all of them, you probably will recall having seen one of them advertised, namely, Smooth-On. This material would not do for a crack of any size, say larger than 1-8 inch in width, if it could be applied with success for one as large even as that. Since this is in the nature of a temporary repair, it would be advisable to do a better job and have the cylinder brazed. The process of brazing, or at least, welding cast iron has been developed to a very great extent, and there are many places where work of this sort may be done. The expense of sending the casting, having a weld made, and return charges would be far below the cost of a new cylinder, the amount being, of course, dependent upon the size and character of the crack. The company making a cement and located nearest to you in the S. H. Brand Company, Chicago.

In the issue of Oct. 21 of THE AUTOMOBILE you will find something on the subject of various treads, the inquirer there asking why the different ones were used. As far as the chafing action on country roads is concerned, we presume that you have taken it for granted that all wagons have exactly 56 1-2 tread and that all of them run in exactly the same track on the road, so that two very narrow ruts are formed of just that distance apart. This assumption is, however, far from the case. Not all wagons have exactly standard tread, there being a slight difference among them, just as among automobile manufacturers. More than this, the wheels of a buggy or wagon get out of true easily and quicker than do those of an auto. Being out of true, the wheels do not make tracks exactly standard tread distance apart.

Taking a real bad case, let us assume that all buggies are of standard tread. Let us further assume that the tires are not over 1 inch wide, and never over 2 inches out of true. That is, one inch inside of standard and one inch outside. The tracks in the road will then measure 54 inches inside to inside and 58 inches outside to outside, and will be each 3 inches wide.

Now, let us assume the worst possible case for an automobile, namely, the narrowest tread and the smallest tires. Suppose we take 55 inch tread and 3 1-2 inch tires. The inside to inside measurements will be 51 1-2 inches and the outside, 58 1-2. The one wheel will then run in a rut, but the other will not, since the width will not allow it, rather it run on the high part of the road inside of the rut, but overhanging the latter somewhat. Due to the limited actual width of the tire in contact with the road, which in turn is due to the circular shape of the outer part of the tire, this overhang will suffer little if any injury from the road ruts. As we assumed the worst possible case, it seems only fair to conclude that there will be very little tire injury from this cause, the wheels varying more than we assumed on buggies, while the tires run wider than 1 inch. So, it will be the ordinary case that the ruts will be about 4 or more inches wide. Larger tires than 3 1-2 are now the case, and the higher tire-inflation pressures now common have both done much to render this form of tire depreciation very small.

More than this, the much larger tires now used would span the narrow ruts, and not drop into them as you have suggested.

The Shawmut car was built in Stoneham, Mass., but its manufacture has been discontinued for some time. There was talk of reorganizing the company at the time of the successful run across the country in the race you speak of, but to our knowledge, this has not yet been effected.

SMALL ELECTRIC HORN

Editor THE AUTOMOBILE:

[2,066]—Will you please advise me of the name and address of the maker of a small horn run by electricity and similar to the Klaxon, both in principle and sound, except that it sells for $10.00. It is a much smaller horn than the latter, and the sound is more subdued. It makes a very nice horn for city use. A party who toured here from St. Louis had one, and I understood him to say that it was a Klaxon. They deny making anything of the sort, however. The horn I have reference to has a short bell, which flares somewhat, and the working part of the horn is small. It also works with an electric button. As I wish to get one of them, I would appreciate it very much if you will help me. H. M. HALL.

Washington, D. C.

While we cannot help you out in so far as telling you the name of the horn in question, we can be of some assistance to you by giving a list of the makers of electric horns. Taking this list as a basis, you can readily find out which firm makes the horn you wish. The firms making electric horns, aside from the company you mentioned, are as follows:

Elkhart Dry Battery & Signal Co., Elkhart, Ind., Electro-Corno.

Theodore H. Gary Company, New York City, Grack-Unicum.

Holtzer-Cabot Electric Company, Brookline, Mass.

O'Brien Electrophone Company, Hallowell, Me.

Russell Electric Company, Danbury, Conn., Treco.

Sireno Company, New York City, Sireno.

S. Smith & Sons, New York City, Crack.

PHONE MAGNETO IGNITION

Editor THE AUTOMOBILE:

[2,067]—I am a constant reader of "The Automobile" and seem to remember, but can not find, an article on the subject of converting a telephone magneto into one for an automobile; that is, so that it can be used for ignition purposes. Will you please tell me in what issue or number that article can be found? E. B. GARRETT.

Knoxville, Tenn.

While not exactly as you describe it, the matter referred to will be found in the June 17 issue of THE AUTOMOBILE, at the head of the first page of letters, under the head of "Gas Engine Ignition." A man located out West asked about converting a small dynamo into a magneto for the purpose of igniting a gas engine, with which he has had some ignition trouble. Our advice to him in part was as follows: "The ordinary current generator gives too low a voltage and at too high an amperage. If your voltage and amperage were correct, the addition of a spark coil and a timing device would give a spark that would run the engine in a satisfactory manner. The ordinary magneto producing a true low tension current (which is intensified by means of a spark coil) gives about 35 volts at less than one ampere. If this be taken at exactly one to allow of some figures on the subject, the coil output will be, disregarding losses, say 20,000 volts at .15 ampere. This is upon two assumptions, namely, that the dynamo is a direct current machine, and that the field is separately excited, at least for starting. The latter statement is plain, if you consider that for starting purposes with a self-excited machine, a spark sufficient to ignite a charge is practically impossible, because of the very slow speed (comparatively) at which the operator can turn the engine over with the consequent slow speed at which the current would begin to build up. Next, as to the exact time of the spark produced by the outfit, if the engine does not already include such an apparatus, you will have to construct one yourself. To be exact, the current supply must be interrupted just before the point in the stroke at which the spark is desired in the cylinder. This might be done by purchasing an ordinary timer on the market and rigging it up on the machine so that the speed is correct for the engine in question." This might also have been arranged with a homemade timer, if you preferred.

If the above does not help you, or is not what you wanted, write again and let us know. We aim to be of as much assistance to our subscribers as is possible. Questions, in particular for the department of "Letters Interesting, Answered and Discussed," are always welcomed.

ANSWERED AND DISCUSSED

CHANGE IN POWER PLANTS

Editor THE AUTOMOBILE:

[2,068]—Will you please tell me why it is that you do not see many two-cycle engines in automobiles? I have a two-cylinder, four-cycle engine in my car and would like to make a change to a three-cylinder, two-cycle engine. Would you think this change a good one to make? Please answer in the next issue of "The Automobile."

EMIL JIRANEK.

Muskegon, Mich.

As to the relative merits of the two different cycles upon which automobile engines work and the reasons for the popularity or lack of popularity of either one, that has been discussed so many times in these columns, that we do not feel warranted in using the space for a repetition here.

If your idea is to secure better balance, the two-cycle two-cylinder would be superior to the present engine, but if you wish additional power with superior balance, the three-cylinder two-cycle would give it, providing you selected the dimensions of the engines in a proper manner. The balance of a three-cylinder two-cycle motor should be as near perfect as a six-cylinder four-cycle engine, which is universally considered to have the best balance of any engine now built or possible to build.

It has long been the idea among automobile builders that perfect balance or an approximate approach to it, was a necessity, but it would appear as if the success of aeronauts abroad with engines which were badly out of balance must lead to a revision of our ideas on the subject of balance. For an instance of this, the Anzani motor has three cylinders arranged radially from a central crankcase, the angle between any two of them being 60 degrees, so that the whole angle between the first cylinder and the last is 120 degrees. This engine is of very poor balance, the firing order being 1, 2 3, then a very long interval, then repeat.

WEIGHT OF AEROPLANES

Editor THE AUTOMOBILE:

[2,069]—Will you please inform me as to the average and maximum weight supported, per square foot of plane surface area, by the successful aeroplanes of to-day?

P. S. CROMER.

Bessemer, Ala.

The weight supported per square foot of surface varies widely in different machines. The Wright aeroplane is the lightset, carrying 1.7 pounds per square foot, and the R. E. P. monoplane, a French production which has actually flown, although never for any great distance, attains the maximum figure of 4.1 pounds per square foot. The heaviest machines which have ever had much success are the Blériot monoplanes. M. Blériot's XI, in which he crossed the English Channel, had a ratio between weight and surface of 3.0. His models XII and XIII, designed to carry two and three people respectively, are about the same. The Antoinette monoplane, familiarized by the exploits of Latham, has a ratio of 2.4, and the Voisin biplanes, piloted by Paulhan, Rougier and others, figures out at 2.6 pounds per square foot. The Curtiss biplane belongs in the lightweight class, its ratio being 2.2. It is impossible to make any average figure, as your letter suggests, because no two people could agree on which machines were of sufficient importance to be considered in the averaging process.

The power of the motor is very important in considering the unit weight. As a rule, the greater the weight per square foot, the greater will be the power required of the motor. The Wrights use a motor of but 25-horsepower in a machine weighing empty 880 pounds. Blériot uses the same power motor in a machine of half the weight, after cutting down his plane area.

The beginner who is making a machine should of course make it as light as is consistent with the necessary strength. That leaves a margin to counteract the effect of wrongly shaped planes or insufficient power. The art of properly curving and proportioning the planes is one of the most valuable assets of the old and experienced makers.

NO-FREEZE SOLUTIONS

Editor THE AUTOMOBILE:

[2,070]—What do you use in a radiator to keep the water from freezing in winter?

W. W. RISHELL.

Montgomery, Pa.

This subject has been pretty thoroughly covered in these columns, but as the subject is one of constant interest we will summarize again. The commonest materials in use are mixtures of alcohol (wood or denatured) or glycerine with water; solutions of calcium chloride in water, and light mineral oils. The proportions of the mixtures and the strength of the solutions vary according to the temperature which the cooling medium is desired to withstand without freezing. In the issue of September 30, in answer to letter 2,029, a diagram is given showing the freezing points of various mixtures of alcohol and water; and in the issue of October 7, letter 2,045, may be found a similar table for solutions of calcium chloride. Mixtures of alcohol and glycerine are discussed in answer to letter 2040, same issue. Of the two different alcohols, wood is by far the better to use, since it contains less water and impurities.

HIGH OR LOW, WHICH?

Editor THE AUTOMOBILE:

[2,071]—Will you please advise me through the columns of "The Automobile," which is the best, from an all around point of view, the high or low tension magneto? What are the disadvantages of the two?

JORDAN HARDWARE CO.

Gordon, Neb.

Your question is too broad to receive an exact answer. If we should ask you which was the better, ten-penny or thirty-penny nails, you would not be able to give a definite answer either.

Each type has its advantages and its faithful adherents, who swear by all the gods that it is the best and that the use of any other is arrant foolishness, etc. However, it would appear from the modern tendency, that is, the most modern, that each has its own field. In support of this, it may be stated without fear of contradiction, that the high tension type seems to be increasing in favor for high speed work. On the other hand, the majority of magneto-ignited gas engines, all of which are slow speed units, use the low tension, with make and break.

It is hard to decide just what you mean by "an all-around point of view." Certainly to throw at the dog, neither one would be more advantageous, since the weight and bulk are approximately equal. From the point of view of igniting the charge, it may not be said that either one has superiority.

Disadvantages of each system vary according to who tells about it. If one of the faithful adherents, it has none; if one of the opposition, it has nothing but disadvantages. This is no more than human nature, which is expressed in the same way with reference to another matter, in the familiar saying "What is one man's meat is another man's poison." So, too, with the ignition cranks, one man's make-and-break low tension system is meat to him, but poison to his neighbor, who has a decided preference for the supposedly simpler high tension system.

RUST IN WATER JACKETS

Editor THE AUTOMOBILE:

[2,072]—Kindly advise me how to prevent the water spaces around the cylinders from rusting when the water is drawn off during cold weather.

S. N. BERLIN.

Kewanee, Ill.

The insides of the water jackets of the cylinders are usually given a coat of some rust-proof paint by the maker of the car, before it is delivered, just for such contingencies as you mention. We do not understand from your letter whether you are merely raising a hypothetical question, or whether you have found that the cylinders of your car do actually rust. If the former, you are quite safe. Even if the maker of your car did neglect to coat the inside of the jackets, however, the small amount of rust that will form will not be enough to do any damage. Anything that you might put in the water to prevent rust would do more harm than good.

STUDEBAKER ELECTRICS ON A LARGE SCALE

SOUTH BEND, IND., Oct. 25—Before launching into a description of Studebaker electrics, it may not be out of place to cite history to show that carriage men are quite alive to the advances being made in transportation methods. The best evidence, perhaps, of Studebaker ability to keep in the lead of the times, lies in the very fact that the blacksmith shop started by the five Studebaker brothers, in 1852, was lost to significance when the founders built up a stupendous carriage business which has lasted from that day to this.

It was progress when the Studebakers embarked in the blacksmith effort, and it was progress when they went into the carriage business. This same progress has its monument in South Bend, Ind., taking on the shape of a plant which covers 101 acres of floor space, in which everything required in the line of horse-drawn vehicles may be had, and for whatever purpose is desired.

Fig. 1—J. M. Studebaker, Sr., only survivor of the original five Studebaker Brothers, driving a Studebaker Victoria-Phaeton

When the new transportation came into vogue, it found Studebaker Brothers alive to the possibilities, and President J. M. Studebaker, Sr., who is depicted in the title illustration, driving an electric Victoria-phaeton, of the Studebaker make, offers evidence of the convincing character of Studebaker alertness. Mr. Studebaker is the only survivor of the original five Studebaker brothers.

Some years ago, when it was apparent that electric vehicles would have a wide use, the Studebaker company engaged Hayden Eames, then chief engineer of the Electric Vehicle Company, to undertake the task of designing and marketing a class of electric vehicles such as would add to Studebaker prestige. Mr. Eames, following out his invariable plan, undertook the large task in a quiet way, preferring to do the work and let others do the talking.

By a systematic process, and a proper display of skill, the plan has prospered, and it will come as a news item of more than a little purport to most people, that the Studebaker Automobile Company will now go into the building of electric vehicles on a large scale, and in view of the other efforts, in the shape of gasoline automobiles, now well under way, it has been decided to make a separate department of the electric vehicle work. C. H. Tyler, one of the able men of the Studebaker staff, will hold sway over the destiny of this separated project.

Expansion After Several Years of Exacting Work—Let it not be supposed that the present move is as a bolt from a clear sky; on the contrary, the amount of electric vehicle work already done by the Studebakers might be classed as large. The car, as offered in the title illustration, is really a last year's model, but it will be continued in response to a brisk demand, for the company has to its credit a vast output of electrics, spreading over several years of consistent endeavor.

The new idea is to take advantage of experience gained, build cars in accordance with the dictates of this same experience, and place the whole matter on an independent footing, holding a department head of wide experience responsible for the result. Mr. Tyler is in the saddle, the work is being pressed in all directions, and Studebaker electrics are being turned out at a rapid rate.

Fig. 2 is of one of the new models, representing a Victoria-phaeton, and is technically designated as Model 17-D. The illustration depicts the lines and work of the designer sufficiently to demand no further word picturing, excepting that it can not be made to show how carefully the work is done at the plant for making bodies, at South Bend, and a word in this direction may not be too much.

Those who may have had experience with electric vehicles are aware of the differences that must be coped with when bodies are for this class of work rather than for use on gasoline automobiles. No matter how well the battery is constructed, it is prone to spread vapor over the surfaces of the body, and many are the failures which may be directly traced to lack of the necessary precaution in this direction. Knowledge of the corroding influence of gases that may be emitted when batteries are undergoing charge stands in good stead when bodies are being made, and this is a strong point in Studebaker practice. Every particle of material used in the body work is absolutely selected with a view to long life, even though, with proper care, batteries may be so charged as to eliminate substantially all this class of trouble. The idea is not to rely upon the men who charge the batteries, and it is better to assume that the work may not be well executed; in this way chance, and its near residence to failure, is done away with.

Chassis Shows Progress in All Directions—Referring to Fig. 3 of the Model 17 chassis it will be observed that the battery is divided into four sections, and two of these sections are placed forward and back, respectively, on the chassis. In this way the sections are so reduced in weight that they are not difficult for the workmen to handle when they have to be removed from the chassis; and it is equally true that the weight is properly distributed over the chassis, and the riding qualities of the car are therefore superior. This weight distribution has other advantages, as, for illustration, the chassis frame does not have to be heavy, and the spring suspension is relieved of weight.

The sections of the battery are nested in trays made of seasoned oak, which has the property of resisting the action of electrolyte, and the trays are so securely bound, by means of iron bands, that there is an entire absence of cell breakage, while, to protect the iron bands, they are given a substantial coating of an acid-proof compound. The wiring system, con-

necting the battery with the controller and the motor, is well installed, using a superior grade of especially insulated copper wire for the purpose, taking care to select such sizes of wire as will reduce losses to a minimum, even when the current flowing is that due to very slow speed work with soft going, on a grade, and, of necessity, very high indeed.

Exide Battery Augurs for Mileage and Life—It is true that the size of the battery must be selected in view of the work to be done, but it is a matter of more than a little experience that dictates the right selection. If the battery is intended to give an unusual radius of travel, it must be at the expense of its life, and it is the Studebaker policy to make a happy selection, rather with the expectation of affording an adequate radius of travel of the car, and to trade in favor of every possible increment of life of the battery.

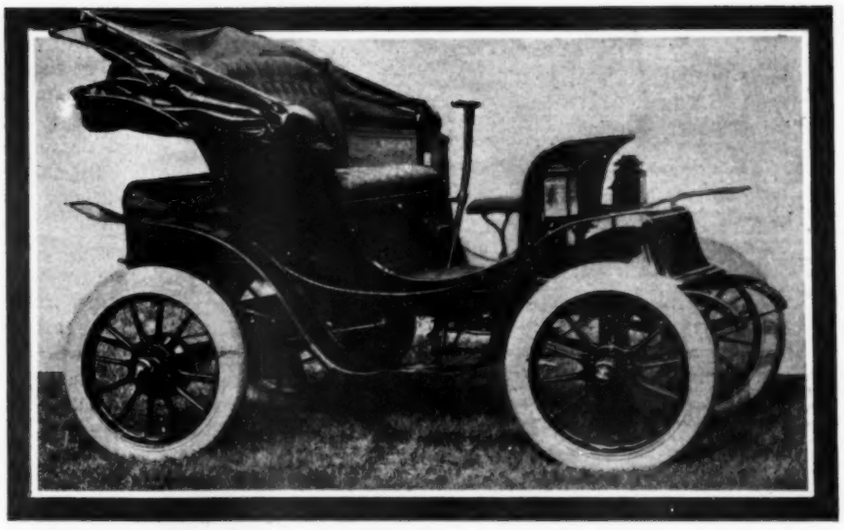


Fig. 2—Model 17-D Victoria-Phaeton with extra seat, divided battery of the Exide type, interlocking control and standard finish

To conserve the battery, ball bearings are used at every point in the transmission system and in the road wheels; but this in itself is not enough. Every car is machined in all its parts with the greatest care, and in the assembling men of skill and a fine sense of discrimination are set to inspect every part. If there is a noticeable addition of friction at any point, the whole undertaking is gone over, and the cause of the friction is eliminated or the parts are cast out.

The motor is so designed that it affords the maximum twisting moment per watt of energy, and, besides reducing the "fixed" losses to the minimum possible, the I^2R losses, so called, are kept within bounds by the judicious use of the right amount of copper wire on the armature and field. The armature is properly laminated, using discs of soft Norway iron, of a special mixture. These, as well as being annealed, are subjected to an aging process, so that the "hysteresis" losses are not only low at the start, but they hold low for the life of the motor. Each disc of iron in the core of the armature is insulated from the other to eliminate "eddy" currents, and, what is more to the point, the insulation is of a permanent character, capable of sustaining all the heat and work to which it may be subjected while under the strain of a load.

The insulation on the wire of the armature is of the finest sea island cotton, wrapped with protecting braid at all necessary points, and each layer is separated from the other by means of insulation of a permanent character. In the same way, the field windings are so protected that they are proof against heat, dampness, and vibration, and retain the high insulation which is necessary if efficiency and long life are to be partners in the enterprise.

The commutator is built up of specially processed segments of copper, so that a uniform hardness is assured for all. The mica used to insulate the segments from each other is of the finest selections from India, of a micrometered thickness, and the whole structure is assembled under great pressure, after which it is chucked and turned to a true diameter. All connections are soldered with a special hard solder, and in the process the joints are scraped to brightness to assure perfect metal-to-metal contact in an electric sense. It is the aim, wherever a joint is made, to have the resistance far less than the normal section of the metal.

Motor Suspension Holds Certain Advantages—The location of the motor is at a point on the chassis just under the seat, and a pair of yoke-like suspenders pass over and around the motor, fastening to a pair of cross members, which in turn fasten to the chassis frame. Shackles, which pass up from the motor frame, on the center line, engage with members which pass down from the pair of yokes, and the motor so suspended is free to respond to adjustment, as the occasion requires, it being the case that the transmission is made, primarily, by means of a Morse "rocker" chain, and finally through a regular sprocket chain.

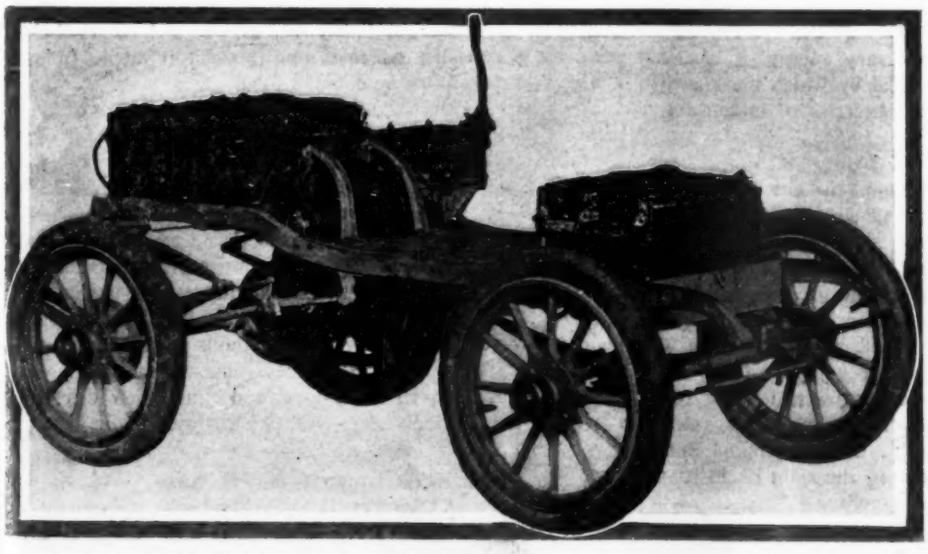


Fig. 3—Model 17 chassis, showing battery in front and rear, motor suspended from yokes, means of adjusting chains, and shaft drive

Fig. 4 shows the chassis from the rear, and the sprocket chain will be seen passing into the housing of the live rear axle, while the Morse chain is enclosed in the "boot" in front of the axle, passing up to the motor. Noise is eliminated, by good mechanical work, but it is insured against by placing oiling devices at every point of vantage, and by the use of suitably contrived chain "boots."

The rear axle is of the floating type, and the driving jaws are of large diameter, with liberal faces and enough of them to assure long life. The material used in the gears, shafts, and other parts of great responsibility, are selected with a view to kinetic work, and by suitable heat-treating, all parts rendered fit.

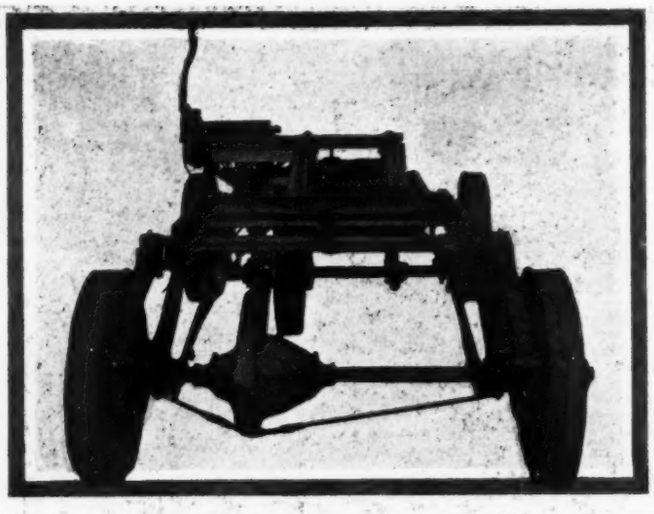


Fig. 4—Rear view of Model 17, showing sprocket chain to live rear axle, boot enclosing Morse "rocker" chain, and full elliptic rear springs

The control system, including its links and levers, is of the straight line design, which is free from "diagonal strains." Considering the use of selected grades of material, ease of manufacture, and ability to determine as to the magnitude of the factor of safety, it conforms to its promise, and the measure of satisfaction is up to the most exacting requirement.

Safeguards for Absent-Minded Users—There are two classes of users who have to be protected against themselves, i.e., the beginner and the operator of much experience who becomes absent-minded. In any event, the design of Studebaker electric vehicles is such that either of these operators will find it impossible to do damage to the cars or hurt themselves. There is only one way that the cars can be started, and that is the right way. By an inter-locking system the five speeds ahead are available progressively, and even if the driver does throw the electrical switch to close the circuit, when the speed lever is out of neutral, nothing will happen. Before the speed lever becomes operative it is necessary to throw it into neutral, release the locking device and close the switch, unless it has been closed at the wrong time.

In starting, suitable resistances are interposed, the idea being to gradually accelerate the car. Watching the ampere meter, which, together with the voltmeter, occupies a place in easy range of vision, discloses how well the control is worked out. There are no sudden and violent fluctuations of current, and the voltage remains practically constant at all times, a feature that will be appreciated by the novice driver as well as by the experienced automobilist.

A dual set of brakes assures ability to stop the car within a short distance, at will, and one of the brakes works by throwing the speed lever back, which is very convenient. The remaining system of brakes works from a foot pedal, which actuates the brake bands in the hubs of the rear wheels within enclosed drums. There are many other nice features of Studebaker cars, the discussion of which will have to be reserved for another time.

SUCCESS FOLLOWS CLOSE ATTENTION TO DETAIL

By C. H. TYLER, Manager Electric Pleasure Vehicle Department Studebaker Automobile Company

IT has long been well appreciated that electrics, as a class, are reliable, primarily due to the continuous twisting moments of the motor (usually designated as "torque"). This torque has a maximum when the motor is starting, and as the motor moves the car the torque, or twisting moment, responds automatically to the demands.

The source of the electric being a battery, it follows that one of great capacity is desirable; but since the life of the battery is involved with the capacity, it also holds that skill, born of experience and judgment, must be the sole guide to success, taking into account the radius of travel of the car which will best serve the ends, and, by limiting the capacity of the battery to the reasonable requirement, produce the maximum of life and the greatest possible return per dollar expended.

If it is true that the motor supplies the requisite twisting moment, taking from the battery the necessary energy, it is also clearly true that a means must be afforded by which the energy may be controlled, and, too, without the exercise of undue care and skill on the part of the operator.

Considering this control requirement as being one of the first essentials, it is necessary to take into account the enormous difficulties involved, in order to appreciate why electric vehicles may have supplied a quota of indifferent success. While on this phase of the subject, it may be as well to point out that the poor success realized in past years was absolutely the product of indifference rather than lack of knowledge, and a display of skill in connection with the motor and battery to the neglect of the controlling system. Perhaps it might be well to add that a fine display of discriminating skill in connection with the leading features as here depicted will fall short of the present high requirement, in the absence of a chassis suitably designed, taking into account the proper suspension of the motor, the right disposition of the battery, and the nesting of the controlling system, as well as proper methods of wiring.

The electric vehicle lends itself so thoroughly to use in the many walks of life, that it would seem almost a crime were the petty faults to remain and the service to be thereby marred. Success in its broadest aspect depends absolutely on the exercise of skill in the design, construction and maintenance of the individual units; but a harmonious corelation of the units must also exist, if the greatest measure of success is to be realized.

From what has been said, it would seem that nothing ever stood in the way of the entire success of electric vehicles, basically considered. But it is also self-evident that this success, in its broadest aspect, is only to be realized in a shop adequately fitted out under the guidance of a corps of engineers, each one of great competence, which, alone, would amount to failure, due to lack of co-operation.

The shop and its facilities, together wtih a corps of engineers, must then, if success be assured, be under the guidance of business men of acumen, and they, in turn, must have at their disposal the potentiality which is only present if ample funds and a wide reputation may be counted upon.

The future of the automobile, which is the matter of the moment, is absolutely assured when all the conditions as enumerated above are thoroughly satisfied.

In the Studebaker establishment, which spreads over 52 years of business in a large way, involving trackless transportation, it has always been the Studebaker idea that a consistent adherence to methods involving conservative but positive advance bring success of the character which accumulates permanence, and in the electrical venture, which started in the Studebaker establishment a few years ago, these same methods were adhered to, and while it looked for a time as if they were not sufficiently aggressive, they have proven to be safe, and Studebaker electrics are now accepted for their sturdy service qualities.

British Automobile Imports and Exports—For September imports of automobiles into Great Britain and Ireland the number of complete cars reported aggregates 243, valued at £81,351; chassis, 358, valued at £101,190. The exports were: 253 complete cars, valued at £103,223; and 17 chassis, valued at £6,[illegible]50.

Standard Six for 1910

Miniature Tonneau Body, the Popular Equipment of the Standard Six—A Clean-Cut Design Throughout

STANDARDIZATION is the keynote of the design, material and workmanship, as well as being a part of the name of the car produced and marketed by the St. Louis Car Company's automobile department, which will be known as the Standard Six.

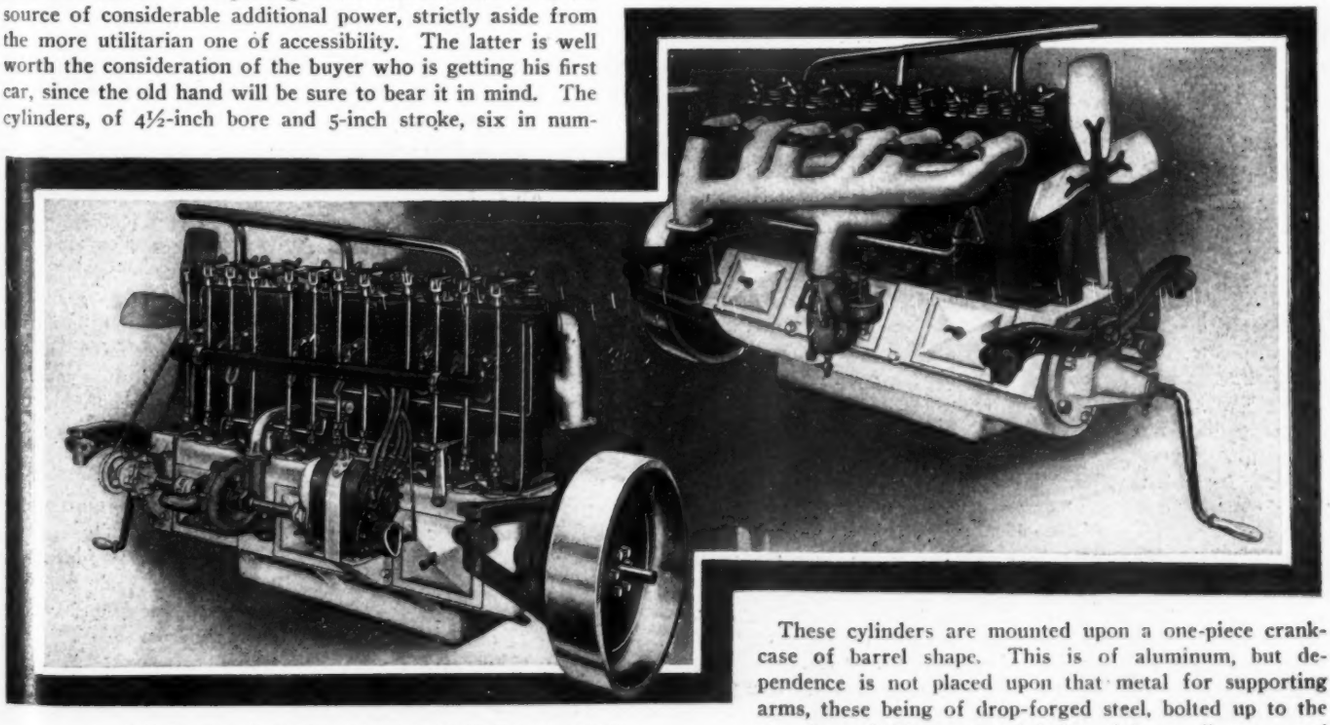
This will be made in but one chassis, which is, however, fitted with four body forms to suit the various needs. The chassis is powered within a six-cylinder engine of comparatively long stroke, although this is not made a feature, the power rating being fixed at 50 horsepower, which is well within the capacity of its size.

To take up in order the features of the car will be to begin with the most important part and finish with those parts of lesser value. Without a doubt, the motor is the most important part in the whole car and should receive the greatest amount of descriptive detail.

Distinctive Engine Features—First to be noticed are the overhead valves. This placing of the valves is said to be the source of considerable additional power, strictly aside from the more utilitarian one of accessibility. The latter is well worth the consideration of the buyer who is getting his first car, since the old hand will be sure to bear it in mind. The cylinders, of 4½-inch bore and 5-inch stroke, six in number, are cast in pairs. Differing from the usual overhead valve construction is the location of the pipes for both inlet and exhaust on the right side. These pipes are yoke-held, which allows of their ready and very quick removal, either one being removable without disturbing the other. Upon that side of the motor, then, there is nothing but the carbureter and the above-mentioned pipes. The result is again a maximum of accessibility.

Opposite to this are placed the rest of the accessories, that is, the magneto and pump, together with the driving means for both of these and for the fan.

The cylinders are water-jacketed for an unusual length, the whole stroke of the piston being covered. The water passages are unusually large, with easy bends, through which the water is driven by means of the centrifugal pump. The latter is of large diameter, driven at a high speed, which, in combination with an artistically designed radiator of large capacity and sufficient depth, insures reliability of cooling at all times.



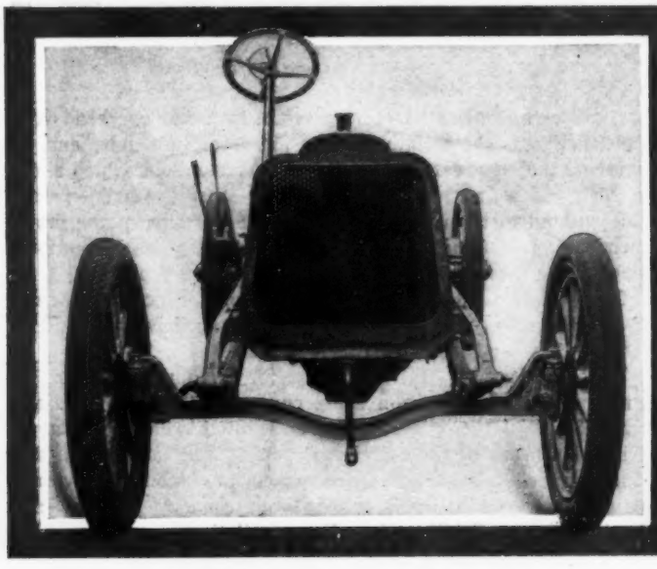
Right- and Left-Hand Views of Standard Six Motor

These cylinders are mounted upon a one-piece crankcase of barrel shape. This is of aluminum, but dependence is not placed upon that metal for supporting arms, these being of drop-forged steel, bolted up to the case by suitably arranged bolts of large diameter and

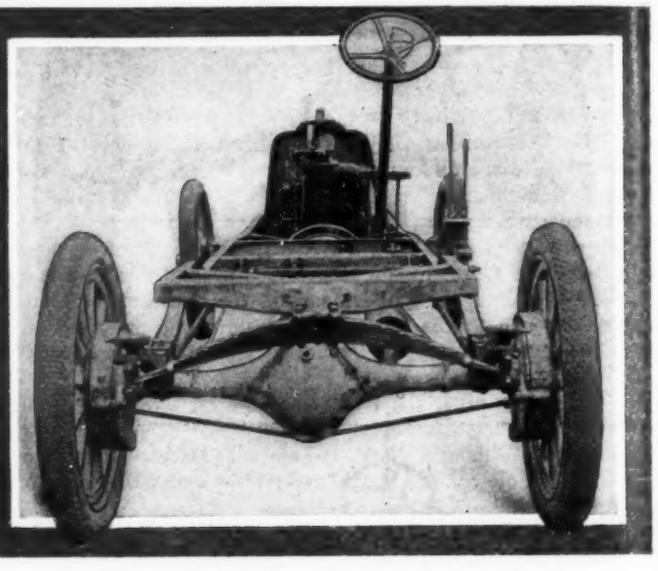
selected material. Being of circular section the ends are closed with circular plates, while the sides have each three large hand holes. With the two end plates and the six side plates removed the inside is as open as it is possible to get it. The lower part of the crankcase forms an oil well from which the lubricating oil is pumped around to the bearings by means of a positively driven pump. This draws its supply from the oil well and maintains a constant level in the bottom of the case. There the lubrication is by splash, the overflow passing through passages on the side of the case to the reservoir below.

Highest Grade Materials Employed Throughout—From one end of the car to the other the materials have been selected for the work they are to do, rather than the reverse. For instance, the crankshaft is of alloy steel. It is a one-piece drop forging, with the flywheel flange at the rear made integral. To prepare it, heat treating is resorted to after it has been finished, finally grinding to an exact size. So, too, with the camshaft. This is a one-piece drop forging, with the cams forged integrally. This form of construction eliminates all pins, keys, cotters, and set screws, with a consequent saving of time, temper and tools.

Inlet and exhaust valves are interchangeable, as are also the cages which they work in. Any one valve may be removed immediately by unscrewing a single nut. The valves are mechanically operated though tappet rods, placed on the left side of the motor, on which side the single camshaft is located.



Chassis of Standard Six, as Seen from Front



Rear View of Same, Showing Axle Construction

How the Fuel Is Supplied to the Engine—Of course, the engine must be fed. This one eats gasoline and is fed through the medium of a patented, improved carbureter, known as the Carter. It is water-jacketed and has an automatic air control, which may, however, be adjusted from the dashboard. This vaporizer was selected after a prolonged series of tests to determine which one was best suited to the peculiar needs of the six-cylinder motor. It has proven reliable at both extremes of speed, the highest and lowest, as well as rendering good efficient service at any speed in between the two extremes.

Ignition is duplicate in so far as the source of current is concerned. A Remy magneto supplies the current ordinarily, but, if desired, dry cells may be used instead, as well as for quick starting. The single set of plugs are located on the left side of the cylinder castings, where they project into the combustion chambers. This location just above the magneto makes the wiring unusually compact and simple. Starting is effected through a push button provided for that purpose and placed on the steering wheel. Efficient construction works to retain the compression at all times, so that this method is always effective.

Probably next in interest to the engine and its accessories would come the clutch and, following that, the transmission. In the Standard Six the two are combined in a unit. The clutch is of the widely used cone type, the inverted cone being used. The face of the clutch is provided with cork inserts. The transmission affords three forward speeds and one reverse, sliding gears operated on the selective plan being the medium. All gears and shafts are of special steel, heat-treated, hardened and ground to size. The shafts are mounted throughout on annular ball bearings.

Control Is Standard—In so far as any control may be said to be standard, in that it follows the majority of the best cars, this one is standardized. Aside from the gear shifting lever, placed at the driver's right, as is also the emergency brake lever, there are the two usual foot pedals. These operate, respectively, the service brakes and the clutch. Then there are the spark and throttle levers, which are placed on top of the steering wheel, within the rim, so as to be convenient to the fingers.

Chrome-nickel steel is the material of the frame. It is made especially for this six-cylinder car by a reputable maker, and in the making, not only is this best of material used, but it is subjected to unusual care in heat treatment, so that the full benefit may be had of the quality which has made this material pre-eminent for withstanding shocks. The front end of the frame is narrowed to permit turning short, while the rear end is raised, or, as it is usually spoken of, dropped to lower the center of gravity without reducing the road clearance.

In combination with the upswept rear end, platform springing is resorted to. The front springs remain semi-elliptic in form. All springs are made from special crucible steel, scientifically designed and tempered. The fronts are 40 inches long, the rear side members 42 inches long, and the rear cross member 38 inches. All of them are of the same width, namely, 2 inches. The platform arrangement, it is needless to add, is one in which the frame is supported from three points, with a consequent relief from all twisting strains. All spring joints are lubricated.

Roller Bearings for Both Axles—Both the front and rear axles are mounted upon taper roller bearings. The front is of the I-section drop-forged in a single piece with the spring seats not only forged integral, but widened out as well, which results in a wider bearing for the spring at that point. The cross-connection is placed back of the axle and the knuckles turn on roller bearings, which are arranged to take the thrust coming at that point. The rear axle is of the full-floating type carrying the whole car weight upon a heavy pressed-steel tube, within which the driving axle turns on Timken roller bearings.

Mounted upon the ends of the axles are the wheels, which are of large diameter; 36 inches is the nominal size, while the number of spokes is 12 in each wheel.

INDIANAPOLIS, IND., Oct. 25—A year and a few days have elapsed since October 10, 1908, when the present Waverley Company took over the plant and business of the Pope Motor Car Company in Indianapolis. The preceding year of depression in general business and of financial embarrassment to the then owning company had reduced the operating force of the plant to 150 men, which was soon found inadequate properly to conduct revived business.

The new company was made up of conservative business men, not disposed to spend money foolishly or to plunge into improvements without substantial grounds for the expenditure, and a policy of judicious and steady expansion was at once inaugurated.

To-day the company has on its pay-roll nearly 600 men, and is steadily adding to the force as fast as skilled and competent men can be obtained in its various departments. With upwards of 200,000 square feet of floor space devoted exclusively to the manufacture of electric carriages, delivery wagons, and trucks, it has already been found necessary to operate part of this great establishment night and day to fill orders. If the present rate of increase continues, the management will soon be obliged to put the entire plant on night and day shifts.

When it is remembered that this is a plant which manufactures electric automobiles from the crude raw materials, operating its own forge and machine shops, and making its own tools; building its own bodies from its own patented designs; forging its own axles and making its own wheels; building its own motors, its own patented controller, and its own exclusive chainless driving system; finishing its coach bodies with sixteen different coats of color and varnish in twenty-eight separate and distinct operations, upholstering them with the choicest and most expensive grades of broadcloth and leather, and turning out a completed carriage unexcelled in perfection of mechanical detail and in artistic design and finish, some idea will be gained of the great variety of engineering and manufacturing processes that are carried on in this gigantic establishment. While the new company is celebrating its first anniversary with satisfaction over the successful results of the year's business and with pleasing anticipations of a future of still greater accomplishment, the factory organization looks back upon nearly twenty years of continuous existence and practical achievement.

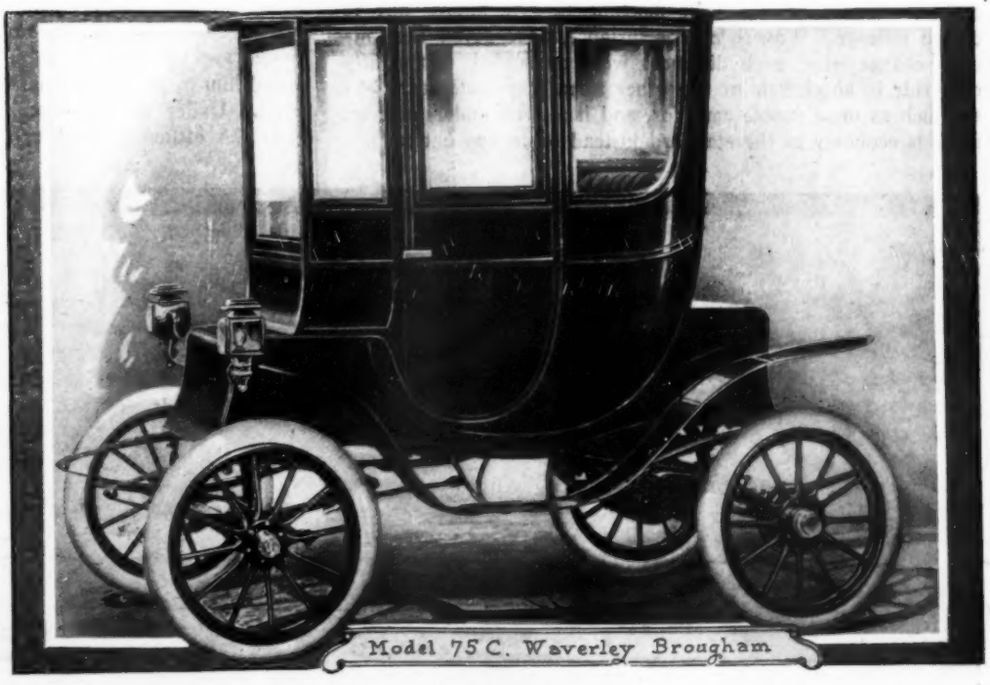
Originally engaged in the business of manufacturing the famous Waverley bicycles, this great factory was among the first to begin experiments with storage battery propulsion as applied to automobiles.

Many costly experiments were made before success was finally achieved, and, as in the beginnings of all new industries, there were not wanting people who were ready to predict that success was impossible. But the leading principles of storage battery propulsion were gradually established by many and frequent trials along different lines.

It soon became evident, for instance, that the electric vehicle and the gasoline touring car were utterly distinct machines, occupying separate fields and coming as little into competition as a family carriage and locomotive. As a matter of fact, the makers of Waverley Electrics saw in the province of the family carriage their especial field and opportunity. They aimed to produce an ideal carriage of high grade, enlarged range, great dependability, superior convenience and delightful freedom from the worries and annoyances that are inseparably connected with all complicated mechanism.

The ultimate success achieved in all these directions was not the result of a sudden inspiration of genius or the product of a single brain. Many minds contributed their share, and the electric carriage of to-day is an evolution of higher types from inferior forms.

With an electric car that has outgrown the experimental stage and has long ago solved all those mechanical problems involved in successful storage battery propulsion, and with a constantly growing demand for this carriage in all quarters of the country,



the present success of the company and its future prosperity as well are most certainly assured.

The names of the officers and stockholders are as follows: President, William B. Cooley; vice-president and manager, Herbert H. Rice; treasurer, Carl von Hake; secretary and assistant manager, Wilbur C. Johnson. Directors: William B. Cooley, Herbert H. Rice, Joseph C. Schaf, Carl von Hake, Hugh Dougherty, Burton E. Parrott, William F. Kuhn. Other stockholders: Aquilla Q. Kones, Hugh M. Love, Alexander C. Ayres, John R. Love, William Kothe.

Of the 1910 Waverley it may be said that it is an improvement upon all previous models of this company's manufacture. The new Waverley driving system makes the use of either solid or pneumatic tires perfectly practicable and satisfactory; the enlarged wheelbase, increased size of the wheel, and the use of full elliptical springs on all new models has added to the comfort of the rider and the serviceability of the machines under all conditions of roads; while the peculiar compactness of build and the beauty of the Waverley designs has not suffered in any particular from the changes made. The fact that Waverleys of this year's design are making distances of from eighty to ninety miles on a single charge without extra batteries and without being stripped for special test runs, has added greatly to the interest in and demand for this make of electrics.

Such results have been reported from many different parts of the country. Thus, M. C. Mathias, superintendent of fire alarms at Reading, Pa., who runs a Waverley runabout, writes: "I have run as far as 90 miles with this machine on one charge, and *never* have to go to the garage for a recharge until I have 70 miles out of it."

This experience is not confined to any one section of the country, or any one person, as is well shown by a parallel case in the East. Thus, the Dodge Motor Vehicle Company of Boston wrote to the factory under date of August 12, saying: "We sold this car (Model 75-C) to Mrs. Hyde, of Allston, Mass., after we had taken one running discharge. The writer then took Mrs. Hyde and her daughter for a ride of 81 miles, from Boston to Marblehead Neck and return to Allston. The car after running this distance, up hill and down, was practically as strong as at starting. We think that you need not hesitate to say that this model with a 32 cell battery will run 100 miles with three or four people."

Many instances of mileage are available and of significance chiefly to show that the days of the electric that will give but fifteen to twenty miles on a charge have gone by. It is now possible to equip any electric machine to give almost any required mileage. Waverleys, for instance, have given 142 miles on a charge when such distances were demanded; but a fifty-mile ride in an electric or any other form of private carriage is as much as most people care for, and it is well understood that there is economy in the standard instead of hy-cap batteries.

HOW WILLYS ENTERED AUTO INDUSTRY

Probably the American boy does not live who has not at one time or another been told that he may be president if he so wills it, states the Toledo *Times*. But how few actually realize that wish! On the other hand, perhaps as much honor attaches to the great captains of industry, which positions, like the other, go to the men with the ability. As a field for the latter, probably no one business offers more opportunity for the young man to rise than the automobile industry, yet most of the large automobile firms have been built up from a small beginning.

One that most assuredly has is that of the Toledo Motor Company, of Indianapolis, Ind., and Toledo, O., which is presided over by John N. Willys. The story of the rise of Willys from practically nothing to president of the largest single company within two years reads like a fairy tale.

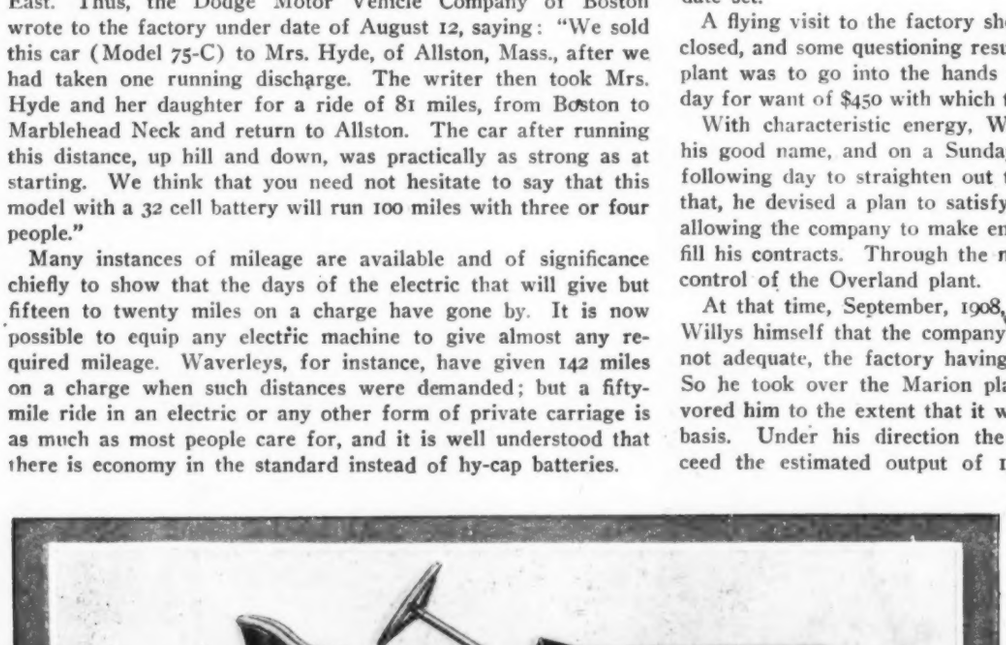
Like many another young man, mechanically inclined, Mr. Willys entered the bicycle business in Canandaigua, N. Y., where his family then lived. From the bicycle to the automobile business was as logical a step for him as it was for a number of the manufacturers whose product he handled. Removing to Elmira, N. Y., he had established the Elmira Sales Company, the object of which was to sell bicycles. Following that came the organization of the American Motor Car Sales Company with headquarters at Indianapolis, Ind.

The latter firm was organized by him for the sole purpose of promoting the sales of the Overland, American and Marion, all Indianapolis-built cars. After several months of thriving business Willys one day found himself in the anomalous position of having sold something that he could not deliver. That is, he had signed contracts for and received a deposit on some 500 Overland cars which were not forthcoming on the date set.

A flying visit to the factory showed the latter to be practically closed, and some questioning resulted in the information that the plant was to go into the hands of a receiver on the following day for want of $450 with which to pay back salaries of workmen.

With characteristic energy, Willys raised $500 practically on his good name, and on a Sunday at that, using this money the following day to straighten out the wages question. More than that, he devised a plan to satisfy the creditors temporarily, thus allowing the company to make enough cars to permit him to fulfill his contracts. Through the medium of this deal he obtained control of the Overland plant.

At that time, September, 1908, no one appreciated better than Willys himself that the company's manufacturing facilities were not adequate, the factory having but 30,000 feet of floor space. So he took over the Marion plant, in which circumstances favored him to the extent that it was far from being on a hopeful basis. Under his direction the two plants were able to exceed the estimated output of 1,500 cars, actually turning out some 4,075 during 1908. Once again confronted with a lack of factory facilities, he obtained an option on thirty acres of land near Indianapolis and planned a monster factory. Before, however, this deal had been closed, he heard of the Pope-Toledo plant, which was then on the market. Within 48 hours after hearing of it he closed a deal in New York City with Col. Albert Pope for the purchase of the plant. This property is now being renovated and put into shape to turn out 12,000 cars for 1910, while the output planned for Indianapolis is 8,000 cars, a total for Willys plants of 20,000.



Model 78 Waverley Roadster

Levi Fletcher, and His "Steam Road Engine" in 1894

PORTLAND, ME., Oct. 25—Stored away in the old Fletcher barn at Hollis is the first automobile ever built in the State of Maine, and possibly the first one ever run over the roads of the Pine Tree State. This is the famous "steam road engine," built by Levi Fletcher some ten or fifteen years ago. Levi Fletcher, who constructed the vehicle, is dead, and thereby passed away a genius, who died of a broken heart.

Mr. Fletcher conceived the idea of a carriage running along the roads without horses. He said that locomotives could make their way along tracks and steam rollers could go through the streets. Why not, then, a pleasure or commercial vehicle driven by the same mysterious force? He told his plans to no one, but quietly went to work on what he conceived would be a steam road engine. He had never seen an automobile nor heard of one, as there were only a very few in existence at that time, and they were in the experimental stage.

He gathered a bit of iron here, some brass there and piping in another place. When he had secured the requisite amount of material he assembled the parts, and the "steam road carriage" was the result. It was not a sightly looking contrivance, but the principle was right, and it ran.

Out upon the road the machine was pushed from the barn and the neighbors stood around in astonishment. With much snorting, and grinding and hissing, the steam vehicle went slowly ahead. It made excellent progress down a grade, but when it struck a hill there was absolutely "nothing doing." Levi saw there must be improvements, so the contrivance was hauled back to the barn.

Repairs and alterations were made and the carriage was so fixed up that he could spin along a country road at a fair rate of speed, but it always balked at hills. One day Levi was puttering about the machine in the barn when he was attracted by a shout, and what was his astonishment to see a real automobile go by. He gazed in open-mouthed wonder, dropped his tools and went into the house. He never again touched his steam carriage and seemed to lose all interest in life. It is said he died of a broken heart.

OHIO LAW DECLARED CONSTITUTIONAL

COLUMBUS, O., Oct. 25—By a decision of the Ohio Supreme Court handed down recently, the Ohio automobile law has been declared to be in accordance with the constitution. The decision is the outcome of an effort on the part of T. M. Drolesbaugh, of Crawford county, to avoid registering his car. When he was arrested he pleaded the unconstitutionality of the State law, on the ground that it was an arbitrary discrimination against automobiles in favor of horse-drawn vehicles, and that it violated Article I, section 2 of the Ohio constitution. The lower courts sustained the constitutionality and the decision was reaffirmed by the highest State tribunal.

HOW THE PNEUMATIC, FINALLY, WAS TESTED

The *Allgemeine Automobile Zeitung*, Berlin, recently published some chapters of incidents of days that are past, some of the anecdotes being of so delightful a character that they will certainly interest American readers as well as those of the Fatherland. In unfolding the tale of the early trials of the Michelin pneumatic, the writer says:

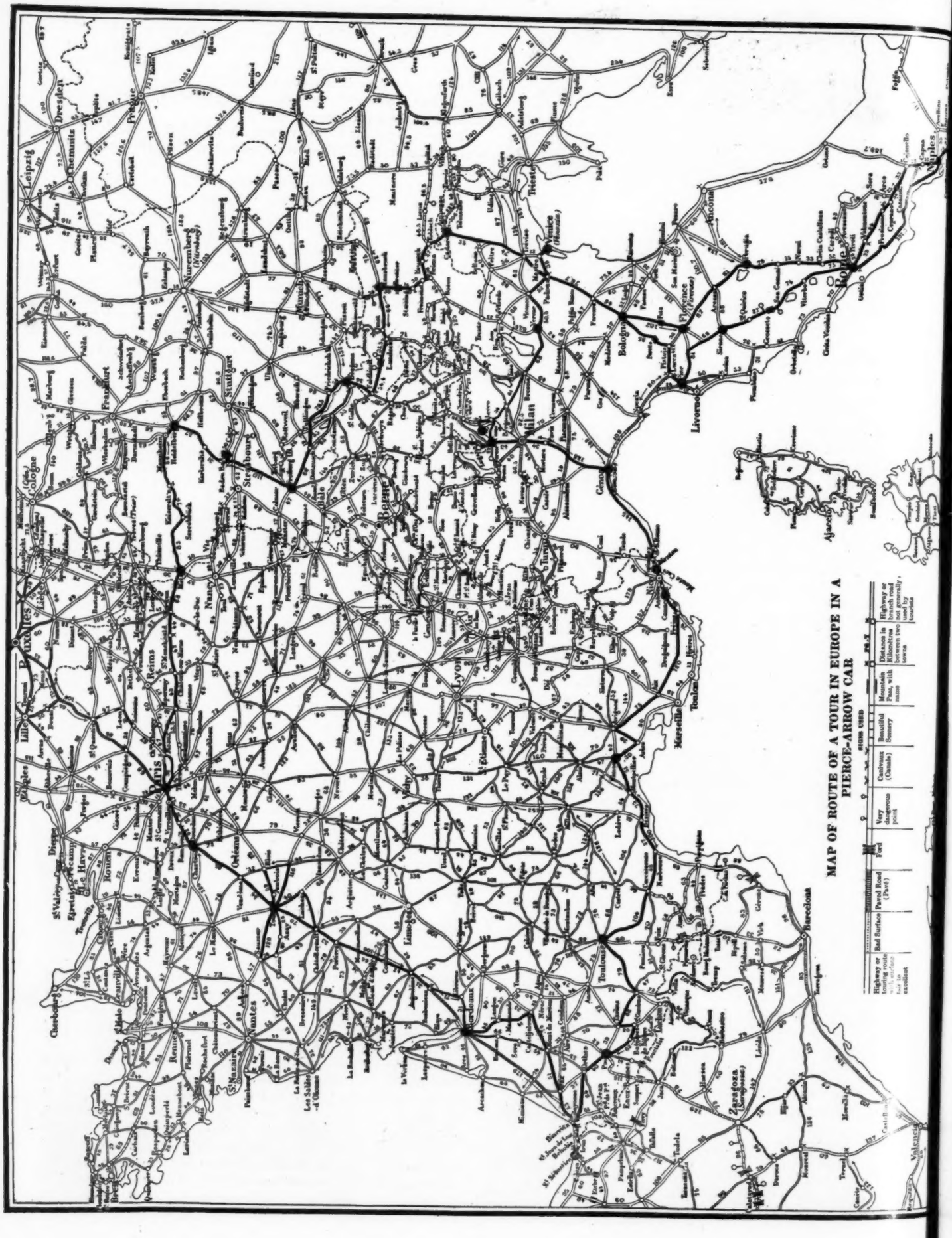
It was a Benz car of the very earliest kind that was destined to take part in the Paris-Bordeaux-Paris race of 1895, equipped with Michelin tires. It was proposed to go over the course with it about three months before the race, and André Michelin was to meet the vehicle at Poitiers. Of course, the whole factory turned out to watch the *Swallow's* arrival at Clermont, and in the very earliest hours of the morning a group of young men posted themselves on the stiffest part of the hill—and waited. When it turned 4 a. m., and nothing was to be seen, they grew impatient, and questioned an old farmer coming along with a herd of cows as to whether he had seen a "carriage without a horse." The old man, naturally thinking they were enjoying a joke at his expense, waxed wroth and shouted: "A carriage without a horse! You cheeky lads, how dare you try to fool an old man like me?"

But at the very minute of speaking a huge cloud of smoke in the distance heralded the approach of the Benz, clambering painfully up the hill, to the great astonishment of the old man, who was thrown into a state of veritable panic by the approaching monster. Unfortunately, the car had an inglorious end without participating in the race, as, shortly before the date, it was found that the cylinder had burst and the water had entered the compression chamber.

It had taken the Clermont people three whole months to find out why the machine of this flighty *Swallow* so often went on strike. Out of the parts of the *Swallow* a new car was built with the greatest speed and hurry, with the help of a 6-horsepower Daimler marine motor bought in Cannstatt. This vehicle was dubbed the *Spiderweb* on account of its light weight, which, it must be acknowledged, existed more in the minds of the constructors than in reality. Only, on building the chassis, which was concluded before the motor came to hand, it was forgotten to leave the necessary space for the engine, and afterwards it had to be put in as best it could. The car, which had no differential, could, however, attain a speed of 35 to 40 kilometers, with its back axle coupled direct with the engine.

Fate cruelly overtook this marvelous vehicle on its first trial, for shortly after its departure the following laconic telegram arrived: "Ran into tree on third speed near Moulins." This tree, unfortunately, did not bend, but sternly rejected the car, with the result that driver and mechanician were thrown into a field.

Undaunted, a third car, a 2 1-2-horsepower Peugeot, was purchased, and a 4-horsepower Daimler engine put into it, which also found its resting-place on the back axle. It was fearfully difficult to steer this vehicle; the car persisted in permanently zigzagging, and this remarkable quality made a great deal of skill imperative to get out of the way of approaching vehicles. Nevertheless, it was determined to take part in the race with it! It was equipped with a lot of spares, in a tool-box of such vast dimensions that it looked like a perambulating arsenal. Thus armed, the car, which weighed 1,400 kilogrammes, set out on its trial runs, during which time it twice ran amuck owing to its miserable steering. The first time all went well, but the second time the mishap occurred at night during a lamp test, in consequence of the forgetfulness of a workman who had carried out an alteration in the wheels, but had forgotten to readjust the brakes. As the back axle had no differential, a strong pull of the hand-brake sufficed to completely throw the car round, and, colliding with a telegraph pole, it threw the whole lot into the field. Of course, the car promptly caught fire, as it was fitted with slow-tube ignition, and burnt down to the metal parts. But it was repaired in time and started in the race, thereby enabling the tires to be tested at least, after this chapter of accidents.


MAP OF ROUTE OF A TOUR IN EUROPE IN A PIERCE-ARROW CAR
Highway or branch road not generally used by tourists
Distance in Kilometres between two towns
Mountain Pass, with ruins
Beautiful Scenery
Cautions (Details)
Very dangerous point
Ford
Paved Road (Paved)
Bad Surface
Highway or branch road not generally used by tourists
Dresden
Leipzig
Chemnitz
Nuremberg
Frankfurt
Stuttgart
Strasbourg
Metz
Nancy
Reims
Paris
Lille
Bruxelles
Dijon
Lyon
Vichy
Milan
Genoa
Turin
Nice
Marseilles
Toulon
Bologna
Florence
Rome
Naples
Ancona
Livorno
Ajaccio
Bastia
Cherbourg
Caen
Rouen
Le Havre
Dieppe
Orleans
Tours
Nantes
Limoges
Bordeaux
Toulouse
Barcelona
Zaragoza
Valencia

SOME CONCISE INFORMATION FOR EUROPEAN TOURING

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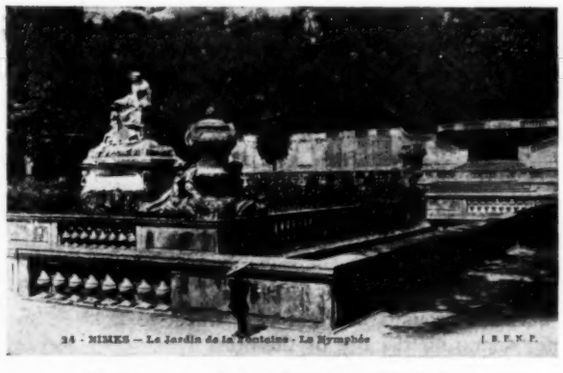
The American's time was limited and his ideas of where he wanted to go and what he wanted to see were vague and general. The car had been shipped direct from the factory at Buffalo, consigned to the company's branch in Paris and so, naturally,

A Medieval Street in Picturesque Loches



The Garden of the Fountains at Nimes

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The advantage of this plan was apparent when the tourist came to make his arrangements. His crated car had been met at the dock by a representative of the branch and driven overland to Paris, there to await him. A courier-valet who spoke English, French, Spanish, Italian, Austrian and German, maps and a store of information concerning road conditions were ready for his inspection, and membership in the Touring Club of France had been arranged. A deposit was made with the Touring Club to cover duties in the countries to be visited, as follows: France, 1,290 francs; Italy, 600 francs; Austria, 2,258 francs; Germany, 539 francs; total $4,687 francs. When this deposit was made a triptyque was given to the tourist and this enabled him to cross the various frontiers without the usual customs formalities other than the signing of the triptyque. When the return to Paris was made and the triptyque, properly signed, given over to the Touring Club of France, the deposit was returned, only a small fee being charged for the accommodations and courtesies the club had furnished.

From the maps provided by the Pierce-Arrow agency and the information furnished by the Touring Club a route was selected

Peasant Women of the Pyrenees Mountains

that led through a beautiful chateau district of France to the east cost of that country and then to the border of Spain long enough for a one-day trip across its boundaries. The route chosen then led along the southern coast of France into Italy and north to Lake Como, then down through that part of Italy which is more familiar to the historian. From there the trip north was made by easy stages through southeastern Austria and the eastern part of Germany, until the tourist again entered France and turned the car over to the Paris branch of the company for shipment home. In the book the complete route is marked by night stops and a more detailed idea of the country traversed is shown by the list of these.

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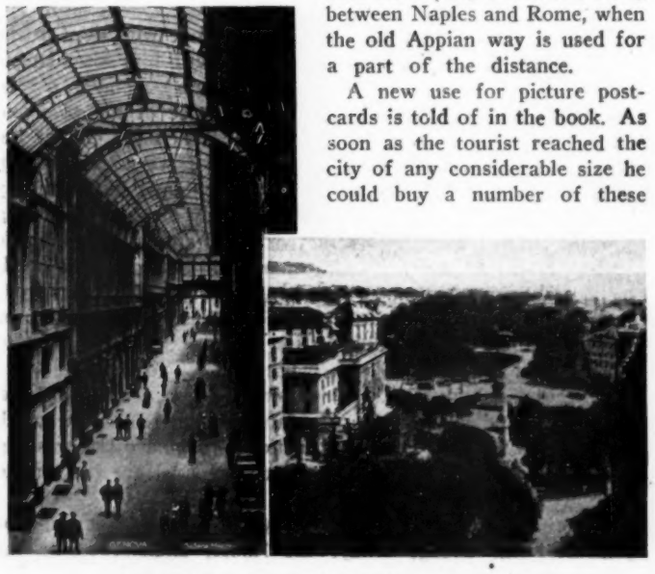
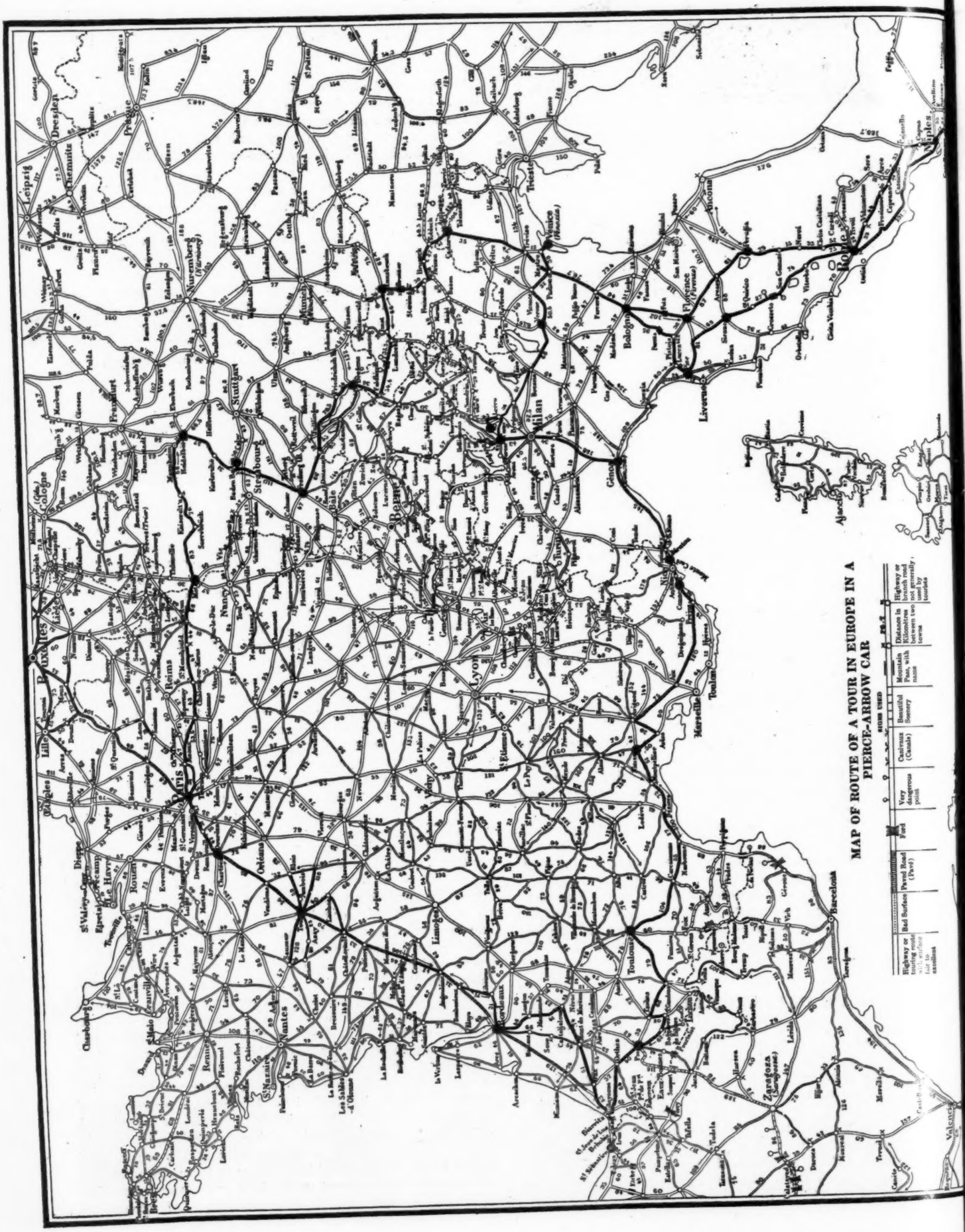


Arcaded Street and Principal Square, Genoa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SIGNS USED
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Very dangerous path
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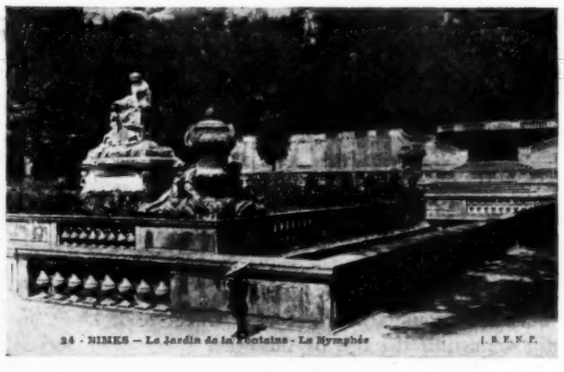

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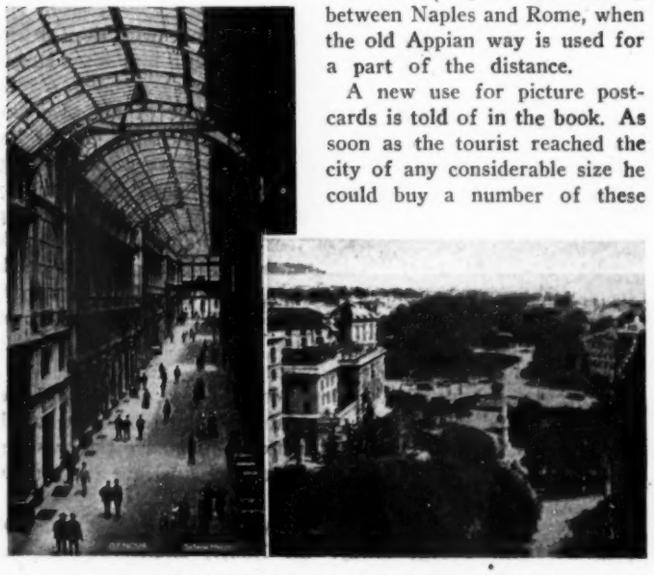

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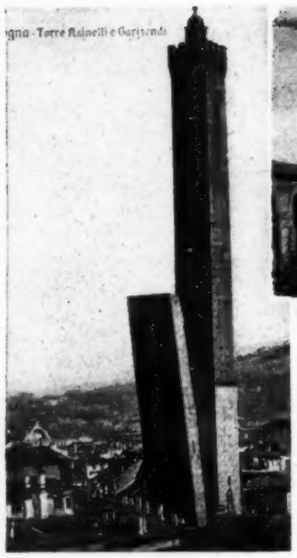


Bologna's Leaning Towers

Arcaded Street to Cathedral

cards, showing the principal places of interest in the city and from them would be enabled to select the places he wished to visit. A courier would then be engaged, at the leading hotel generally, and with his assistance the places selected could be seen to their best advantage.

In the back of the book is a map, 16 x 19 inches in size, showing the principal roads through the countries visited, the cities and towns, boundary lines, distances and road conditions. The route used by the tourist who furnished the material for the book is shown and his night stopping places are indicated by black circles. In addition to the map the book is well illustrated by views of buildings, cities and mountain scenes encountered on the trip.

It is not the intention of the company in issuing this book to prescribe a route that should be followed by motor car tourists in Europe, but merely to show what can be done by an American owner of an American car who, with his time limited, goes to Europe to see as much of the instructive, beautiful and entertaining as he can. Whether he wishes, in a general way, to follow the route shown or not, the book contains a store of information in the most concise form.

Altogether, the mileage of the car was 5,170. Of this, 1,208 miles were taken up by the trip from Havre to Paris and the return and the side trips made during the tour. No accurate record of the mileage of the side trips was kept, and for this reason the only distances recorded are those between the night stops. These are:

	Kilometers	Miles
Paris to Tours	232	144
Tours to side trip	147	92
Tours to side trip	160	99
Tours to side trip	193	120
Tours to Bordeaux	313	194
Bordeaux to Biarritz	264	164
Biarritz to side trip	108	67
Biarritz to Pau	104	65
Pau to Toulouse	229	142
Toulouse to Nimes	310	193
Nimes to Cannes	299	186
Cannes to Monte Carlo	54	34
Monte Carlo to Genoa	170	106
Genoa to Como	171	106
Como to Bellagio	85	53
Bellagio to Verona	213	132
Verona to Venice	120	75
Venice to Bologna	161	100
Bologna to Florence	102	63
Florence to Perugia	168	104
Perugia to Rome	178	111
Rome to Naples	229	142
Naples to side trip	90	56
Naples to Rome	191	119
Rome to Siena	219	136
Siena to Pish	114	71
Pisa to Bologna	160	99
Bologna to Pierre di Cadore	274	170
Cadore to Innsbruck	183	114
Innsbruck to Bregenz	156	97
Bregenz to Freiburg	178	111
Freiburg to Heidelberg	198	123
Heidelberg to Metz	215	134
Metz to Paris	290	180
Total	6,279	3,902

HOW THE AUTOMOBILE WASHED THE CLOTHES

By R. J. GRISWOLD

EXTREMES touch when an automobile figures in the Monday washing, but that is what certain residents of a Michigan town saw not so long ago. Seeing is believing, and although I had to turn out at 5 o'clock in the morning to witness the demonstration, it was worth the effort.

This is how it happened. A friend of mine who lives in the country had a guest from the city staying with him for a couple of weeks. A neighbor who was a temporary member of the Merry Widowers' Club, owing to the absence of his wife and family, was also sharing his hospitality. When the end of the week rolled around there was naturally an extra large washing. This did not cause the housewife any worry until, late Saturday afternoon she received a note from the lady of the tubs stating that the latter was going on a short vacation and would be unable to be present as usual Monday morning. Madam must needs make other arrangements. The C. Q. D. signal was displayed; they scoured the neighborhood, but not a washwoman was to be found. Finally in utter distress the lady of the house went to her husband and said: "George, what *shall* we do?"

George simply smiled. "Don't worry, my dear," said he. "Keep cool and take it easy. A plan has occurred to me which I think will take care of the situation. Just have the washing ready Monday morning, bright and early, and leave the rest to me."

The evening and the following day were spent in a round of pleasure, with George always the leader, undisturbed by the burden of responsibility which he had assumed.

Sunday afternoon George slipped out to the garage, and patting his car on the hood, said: "Old fellow, it's you for the washing to-morrow."

Donning his overalls, he jacked up the rear axle and placed a broomstick through the right rear wheel to hold it stationary. After taking off the tire of the other rear wheel he brought in the washing machine, fastening it with cleats to keep it from moving. With two trunk straps buckled together he made an endless belt which he placed over the left rear wheel and the wheel of the washing machine.

The rest was easy. I was tipped off to appear on the scene at five in the morning. When I entered the garage, rubbing my eyes, George was comfortably seated in the front seat, smoking a cigar. The car was chugging along on middle gear, and the washing machine was running as it had never run before. The hired girl and the man of all work were kept on the jump putting in and taking out the clothes. I couldn't help thinking of the feelings of that poor old washing machine. It certainly must have thought that it had struck some one with an arm of iron.

AUTOS COMPETE WITH ELECTRIC LINES

Increased fares on the electric interurban lines running out of Tacoma, Wash., caused the establishment of an automobile service between that city, Brookville, Fife and Milton. The increase made the fare to Milton 26 cents, instead of the old rate of 15 cents, which the automobile line will endeavor to maintain.

EXPENSES OF AN AMERICAN'S TRIP IN EUROPE

AN IDEAL trip of 6,700 miles through England, France and Algeria, which was made last Summer by A. Lowes Dickinson, of the Automobile Club of America, in a 40-horsepower Locomobile, offers to prospective imitators a complete table of the expenses which may be looked for. Mr. Dickinson kept a log-book of the tour, showing in detail all expenditures, and averaged these for mileage. Automobilists who contemplate taking their cars abroad and adopting the most delightful way of seeing a foreign country, may obtain many useful pointers from his figures.

Five weeks were spent on British soil. From the landing at Southampton the route lay across the English downs, through masses of heather, to Castle Malwood, the seat of Lady Harcourt, and the Rufus Stone, where William Rufus was killed in the year 1100. Thence through the Great Forest to the Avon Valley, stopping for luncheon at the quaint White Hart Inn, at Salisbury, the party went on through Amesbury and past the big military camp at Bulford, concluding the first day's run at Winchester. The remainder of the first week was spent in leisurely touring to London via Brighton, visiting on the way St. Leonnards, Hythe, Charing, with its picturesque old half-timbered house, Yew Tree Farm, beautiful Leeds Castle and steep Ryegate Hill, the route made famous by coaching parties.

While at the English metropolis a number of days were spent in making various short and long trips about the city, among them being jaunts to Windsor Castle, Baldock, Richmond Park, Gad's Hill, the home of Charles Dickens, and other places of note.

After completing 2,000 miles in England the car was shipped to Boulogne, France. At the latter place it was necessary to wait four hours for driving licenses, the usual test drive being required. Striking out over the Route Nationale and into the valley of the Somme, the first night stop was made at Amiens, 76 miles from Boulogne. After spending a morning in exploring the Cathedral the party threaded its way over the undulating roads and chalk table land through Breteuil, Beauvais, Allone and Meru, where the beauty of the country became greater. At Conflans, the Seine was crossed for the first time, the route then lying through the Forêt de St. Germain country. At first the roads were bad, but upon reaching Suresnes and passing into the Bois de Boulogne (where duty has to be paid on gasoline) and on to Paris, the road is all that is to be desired.

From the French capital jaunts were made through the Chateau country, St. Cyr, Rambouillet, Voisins and Chartres. After an exploration of the ancient Chateau de Blois and nearby spots the party bore over to Tours, then down the Loire Valley to Liginières, lunching at inns, and thence driving into the Indre Valley and southward to historic Poitiers.

Leaving bright and early, a strenuous run of 200 miles was made toward the Pyrenees, ending in Agen at 8:30 in the evening. Several days were then spent journeying a few hundred miles through Coarraze, Lourdes, Pau, the Tournay country, before the Mediterranean was sighted. A visit was made to the Maison Carrée, the almost perfect specimen of an old Roman temple, with the old Roman baths nearby, and thence down to Avignon.

The road from here through Aix, Cannes and Nice was uninteresting, being much cut up with wine traffic. Pushing onward the following day on the wonderful Corniche d'Or road, along the beautiful country of the Gulf of St. Tropez, and through the winding mountains with their gorgeous scenery, the ride into Marseilles (1,725 miles from Boulogne) was a delight.

After some annoying trouble occupying several hours the car was loaded onto a steamer and run through a terribly rough sea to Algiers in about 30 hours. The freight rate is 227 francs for a car weighing 3,910 pounds, and the transportation company charges 100 francs additional for insurance, but as there is great doubt as to what this insurance actually covers, it is better to insure through Lloyds, which can be done for one-quarter of one per cent. There are several lines by which a car can be carried to Algiers.

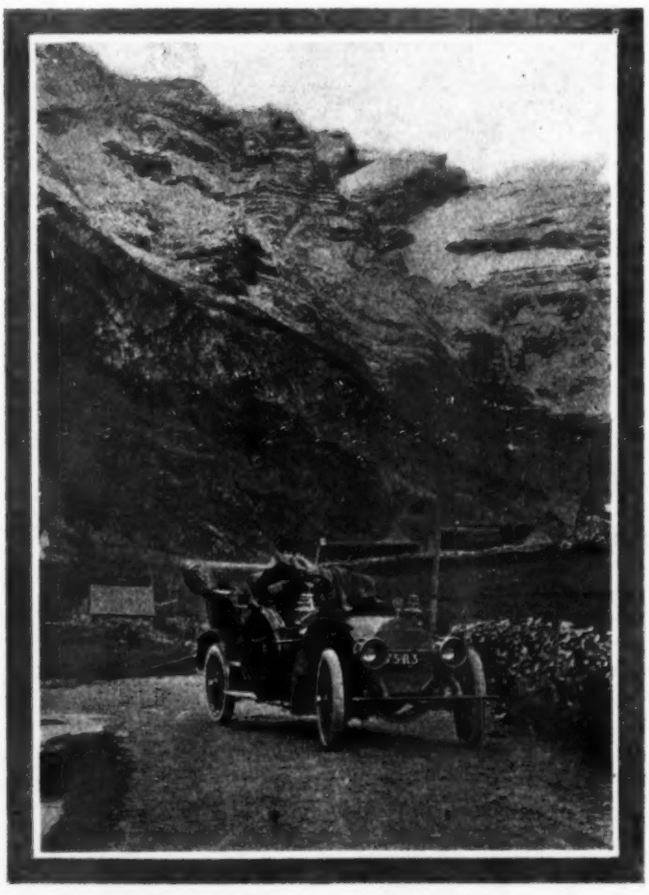
The party spent five weeks in Algeria, visiting both known and remote parts, upon which notes in the log-book of the Loco are quite lengthy and would fill a small-sized book. The return trip was made via Marseilles and then direct to Havre in six days.

The following statement of running cost, kept very accurately, gives a fair idea of what an automobilist has to spend to take his family abroad on a 6,700 mile trip, with a car of ample power:

Cost per mile run.	In England 30 running days, 2,000 miles	In France & Algeria 47 running days, 4,700 miles
Gasoline	$0.031	$0.0496
Oil	.0092	.0063
Repairs and spare parts	.0069	.0065
Supplies and sundries	.0045	.0039
Garage, cleaning, etc.	.0176	.0142
Tire expenses	.0786	.0729
Licenses	.0076	.0049
Chauffeur's board and expenses	.0446	.0294
	.20	.1877
Freight, England to France and France to Algiers and back		.0381
Total cost per mile	.20	.2258

Number of gallons used, 215
Miles per gallon on gasoline used, 9.3

Hotel expenses, leaving out of account Paris and Nice, where any price may be paid, averaged throughout France and Algeria $4 per day each. This included wine, tips and all expenses, and in every case rooms containing two beds, which are more expensive. The chauffeur's expenses averaged $1.75 a day.



Mr. Dickinson's 40-H.P. Locomobile at Gavarnie, France

THE AUTOMOBILE

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UNIFORM REGULATIONS ABROAD

Common sense triumphed again over medieval provincialism when France, Germany, Belgium, Italy, Bulgaria, Roumania, Montenegro, Servia and Monaco signed the international automobile regulations. These nations may henceforth be regarded as the promised lands of the automobilist. Although few Americans may expect to visit the countries which form the latter half of the list—indeed we suspect that few could locate them on the map, except the very last one—it will readily be admitted that they have proved themselves worthy to be enrolled among the progressive nations of the world, and deserve a share of the benefits of intercourse by automobile.

The regulations thus adopted are few and simple, but important. They embody the very points which every automobilist hopes to find soon in the laws of our several States. The examination of drivers and cars and the issuance of an international license, the regulation of lights and signals, and the adoption of uniform road signs; finally, the elimination of customs annoyances—all these are calculated to make touring in the favored countries an unalloyed pleasure.

Great Britain alone, of the commonly traveled European countries, proved recalcitrant. England resemble the United States in many ways. Both apparently regard the extortion of a few dollars revenue as of more importance than the safety of the general public; thus they issue driving licenses to anyone who can pay the necessary fee and are unwilling to go to the bother and expense of an examination. In both countries, too, the political powers in supremacy appear to be afraid to entrust their representatives with any degree of responsibility. We may talk of the dilatoriness and inefficiency of the Latin races, but in this instance they acted with remarkable promptness and certainty. Great Britain, however, still has a chance to redeem herself.

Nor is the United States entirely without hope of being able to join the ranks of progress. The American Automobile Association has in preparation a bill to be presented to the next Congress, which embodies most of the features of the international regulations, as well as others more adapted to the particular needs of the country. That phase of the bill which is of the greatest importance, however, does not lie in its individual features, but in the assumption by the Federal Government of the right to control automobile traffic as being interstate.

FACTORS INFLUENCING PRODUCTION

Hardly a week passes without the addition of several new concerns to the already long list of automobile manufacturers, or, more correctly, makers. This is a matter causing some apprehension, for those inclined to worry figure that the output of the newcomers will be large, and this, added to the already swollen estimates of 1910 productions, brings the grand total for the year up to figures which are alarming to contemplate. Certainly, if every firm produces the full number of cars now credited to it, there will be overproduction of the worst kind.

But few of the hurriedly launched companies weather the first season; a smaller number produce cars at all, and a scant percentage approach quantity estimates.

This is a statement which is borne out by facts and figures relative to companies in the past and may readily be verified. The starting of a new concern of this sort, to manufacture or even assemble automobiles, requires a number of points to produce ultimate success, and the lack of any one of them spells failure.

Thus there must be sufficient capital, there must be the ability to use it wisely, there must be an able design, and there must, above all, be mechanical ability and shop equipment to produce the design in actuality. From the lack of any one of these the new concern will go under. Lack of capital hampers many firms, and, according to statistics, produces about one-fourth of all failures. In the present day and time, with a parts famine imminent, this would have great bearing. The ability to use the capital wisely and well probably goes with the first, or amount of capital, since in the end it amounts to the same thing. The man or men unable to use their capital to the best advantage would practically never have enough.

The design is of paramount importance, too, for if the designer fall down on a very small point, perhaps so small as to be thought insignificant, and the first cars do not take well, the result is the same as if the design had been worthless. More than this, without a shop equipped properly to work out the designer's ideas his plans may become worthless.

So it may be said that there are many components which enter into the makeup of a successful automobile, of which few of the mushroom companies now springing up over night possess all, and many of whom possess not even a majority of them.

E.-M.-F. TO HAVE CANADIAN PLANT

DETROIT, Oct. 25—Not content with controlling a big slice of the automobile business on this side of the border the E.-M.-F. Company is going after foreign trade in earnest.

The first step in the consummation of this plan is the establishment of a $400,000 automobile plant at Walkerville, Canada, just across the river from Detroit, and the organization of the "E.-M.-F. Company of Canada." The concern will be merely a subsidiary company of the Detroit firm, although new capital has been interested in the undertaking. Foremost among the incorporators are Frederick H. and J. Harrington Walker, of the Hiram Walker & Sons Company, leading distillers in the dominion, and it is understood that they, together with Dr. J. B. Book, Charles L. Palms and Walter E. Flanders, of the Detroit E.-M.-F. Company, will furnish all the money needed. Mr. Flanders is president and general manager of the new concern, and Robert M. Brownson, secretary and treasurer. A factory building has been secured in Walkerville and machinery will be installed sufficient to ultimately give a daily capacity of 100 E.-M.-F. "30" and Studebaker-Flanders "20" cars.

The E.-M.-F. Company of Canada will not, it is announced, content itself with the trade of the dominion. It has enjoyed an excellent demand for cars from Canadian points, but there was always a heavy duty to contend with. This difficulty will now be obviated. Furthermore, an inviting field is found in the other portions of the British Empire, particularly India, New Zealand and Australia. By shipping its cars from a Canadian instead of an American port the company will be entitled to a 99 per cent. rebate in duties, an item well worth considering and which will give it a decided advantage over manufacturers on this side of the border. The present plan has been under consideration for some time.

DETROIT DEALERS' SHOW TO BE BIG

DETROIT, Oct. 25—January 24-29, inclusive, are the dates selected by the Detroit Auto Dealers' Association for its third annual automobile show, which will be held in the Wayne Hotel Gardens. This is not Detroit's third automobile show, but the third one under the auspices of the dealers' association. To deal in figures, it is the eighth annual exhibit that has been held in the City of the Straits, and each year has seen something better than its predecessor.

For the 1910 show there is 35,000 square feet of space available, and, inasmuch as it falls at the interval between the New York and Chicago exhibitions, there is every reason to believe that the exhibits will be more varied than ever. The dealers' association has voted $10,000 to be utilized in decorations for the gardens, which is $2,000 more than was voted for last year's show, and exhibitors will not be required to decorate, that expense being included in the price of space.

John Gillispie, who so successfully handled the arrangements for the ceremonies in connection with the start of the Glidden Tour from Detroit last summer, has been chosen manager.

DETROIT ADDS THE ANHUT CAR

DETROIT, Oct. 25—If this city fails to produce its full proportion of the automobiles manufactured the coming season it will be no fault of sundry ambitious and optimistic Detroiters. The organization of a new automobile company is of weekly occurrence.

The latest to be added to a long string is the Anhut Motor Car Company, capitalized at $150,000, which has been organized by State Senator John N. Anhut. Others in the company are H. H. Lonsby, Thomas F. Ahern and John B. Chaddock, Detroit, and Charles Lonsby, of Mt. Clemens.

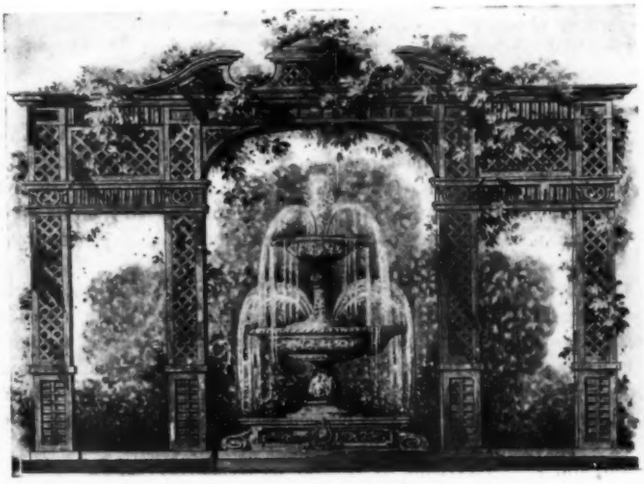
The company expects to begin manufacturing cars about the first of the year, and hopes to build 1,000 36-horsepower machines the first year.

This makes no less than seven automobile manufacturing companies that have been organized here in the last two months.

PALACE ELECTRICAL AND WATER EFFECTS

When the tenth annual show of the A. M. C. M. A. opens in Grand Central Palace, New Year's eve, the public and exhibitors will be treated to a combination of electrical and water effects such as has never been seen before. The decorators of the Palace, Unitt & Wickes, the Hudson-Fulton decorators for the city of New York, have evolved a decorative scheme this time, which including as it does some wonderful scenic features involving the liberal use of electricity and water, is said to surpass anything ever produced in this line.

Stationed at the end of the main hall, where last year was placed the figures of "Age Instructing Youth," will be a marble fountain. The base of this, in which real water will be used in great quantities, supplied by a rotary pump, will measure 16 feet across by 14 feet high. Back of the fountain, so placed as to enhance the water and electrical effect, will be a hugh mirror of plate glass. Surrounding the two will be a peristyle, 40 by 25 feet in extent, and coverd with green trellis work. At the base of the fountain and around the peristyle, trees, shrubbery and potted plants will be placed. The effect will be spectacular in every sense of the word, and at the same time a suitable blending of harmonious colors will lend an Arabian Nights glamour to the decorative scheme as a whole.



Electrical Fountain for Grand Central Palace Show

PLANS FOR BOSTON'S BIG SHOW

BOSTON, Oct. 25—Application blanks for space in the eighth annual Boston Automobile Show, to be held March 5 to 12, 1910, in Mechanics Building under the auspices of the Boston Automobile Dealers' Association, have been sent out by General Manager Chester I. Campbell. For the show there will be available 105,000 square feet of show space, but the applications that already have been filed cover approximately eighty per cent. of the space. The preliminary allotment to members of the Dealers' Association has been made, and also the allotment to the members of the Motor and Accessories Manufacturers.

The show will be upon similar lines to those in the past, but the great increase in the number of pleasure cars has made it necessary for Manager Campbell to arrange for another division of this part of the show. Heretofore the pleasure cars have been exhibited on the street floors of the two main halls with overflow exhibits in the balcony and basement. In order to keep the cars out of the balcony Manager Campbell plans to have a special pleasure car department in one end of exhibition hall basement. This department will have special decorations.

The motor cycle department that has been in the basement will be moved to Talbot hall, a large hall off the balcony of exhibition hall, and the café will be in the basement. The decorative scheme for the show is being worked out, but has not yet been fully decided.

DEATH OF GEO. T. BARNSLEY

PITTSBURGH, Oct. 25—Geo. Thos. Barnsley, road engineer of Allegheny county, died Saturday of heart failure. Mr. Barnsley was an officer of the Automobile Club of Pittsburgh, and it was chiefly under his direction that the County Roads contest now being brought to a close, was started last February. He had one great ambition, namely, to get 600 miles of macadamized roadway in Allegheny county. Already he had accomplished more than one-half of this task, and his plans were well laid for completing the remaining 300 miles, which would make more than one-third of the county roads macadamized.

During the past ten years Mr. Barnsley has been a steadfast advocate for the kind of roads which automobilists like to see, and every effort which he could put forth to secure better facilities for the automobilsts of Pittsburgh was cheerfully given. He rendered splendid service in the sign campaign, and also in securing effective city and state legislation of benefit to automobile owners and users. His death has taken from Pennsylvania its most noted road engineer, and a man who will be greatly missed by automobilists.

Mr. Barnsley was forty-five years of age, and had always been a resident of Pennsylvania. He was a graduate of the Rensselaer Polytechnic Institute of Troy, N. Y. He served successfully as engineer with the Norfolk & Western Railway Co.; the Pennsylvania Lines, and as chief engineer of the Wabash-Pittsburgh Terminal System. He was elected road engineer of Allegheny county in 1906.

CONVERSE NOW MASSACHUSETTS LEADER

BOSTON, Oct. 25—The annual meeting of the Massachusetts State Automobile Association was held last Thursday evening in the rooms of the Bay State Automobile Association, with a fair representation of delegates of the different clubs. A. E. Bliss, president, was in the chair.

At the election of officers A. D. Converse, of Winchendon, the past year chairman of the legislative committee of the association, was chosen president for the coming year. John P. Coughlin, president of the Worcester Automobile Club, was elected vice-president, and James Fortescue, secretary of the Bay State Automobile Association, was elected secretary and treasurer. He succeeds H. M. Sawyer, of Worcester, in the secretary's position, and J. C. Kerrison, of Boston, as treasurer.

The association passed a vote of thanks to Mr. Kerrison for his work as treasurer the past four years and elected him a permanent member of the association. The headquarters of the association will be at 24 Milk street, Boston, the secretary's office.

Mr. Converse presented an exhaustive report of the Committee on Legislation, telling in detail of its work in connection with the new automobile law that was passed by the Legislature last session. The committee considers the new law exceedingly fair to motorists and advocates giving it a fair trial. W. H. Chase, for the Good Roads Committee, presented a report showing that his committee had not been idle. The report urged upon the constituent clubs more energetic action in the cause of good roads. It was reported that several new clubs have been formed in the State and will be admitted to the State association. The new officers also are planning a campaign to secure a large number of new individual members.

MOORE OF MILWAUKEE, WISCONSIN HEAD

MILWAUKEE, WIS., Oct. 25—M. C. Moore, of Milwuakee, is the new president of the Wisconsin State Automobile Association, and he states that he will work with the spark advanced and the throttle wide open. James T. Drought continues as secretary, and George A. West remains in the treasurer's place. F. P. Hixon, of La Crosse, is first vice-president, and H. L. Halverson, of Whitewater, is second vice-president. The executive committee ocnsists of: A. R. Barker, Portage; C. W. Norris, Milwaukee; A. J. Horlick, Racine; George A. West, Milwaukee; James T. Drought, Milwaukee.

THE AUTOMOBILE CALENDAR

AMERICAN

Shows, Meetings, Etc.

Nov. 6-13.....Atlanta, Ga., Auditorium-Armory, National Automobile Show, auspices of National Association of Automobile Manufacturers. Samuel A. Miles and Alfred Reeves, General Managers, 7 East 42d Street, New York City.

Dec. 31-Jan. 7....New York City, Grand Central Palace, Tenth International Automobile Show; American Motor Car Manufacturers' Association, with Importers' Automobile Salon and Motor and Accessory Manufacturers. Alfred Reeves, General Manager, 501 Fifth Avenue, New York.

Jan. 8-15.....New York City, Madison Square Garden, Tenth National Show, Association of Licensed Automobile Manufacturers.

Jan. 17-22.....Philadelphia, Second Regiment Armory, Automobile Show. J. H. Beck, Secretary, 216 Odd Fellows Building.

Jan. 24-29.....Detroit, Wayne Hotel Gardens, Third Annual Automobile Show, Detroit Auto Dealers' Association. John Gillispie, Manager, Hotel Tuller.

Feb. 5-12.....Chicago, Coliseum, Ninth Annual Automobile Show, National Association of Automobile Manufacturers. S. A. Miles, General Manager.

Feb. 14-19.....Buffalo, N. Y., Broadway Arsenal, Eighth Annual Automobile Show, Automobile Club of Buffalo. Dal H. Lewis, Manager, 760 Main Street.

Feb. 19-26.....Newark, N. J., Essex Troop Armory, Automobile Show, New Jersey Exhibition Company.

Feb. 21-26.....Binghamton, N. Y., State Armory, Automobile Show. R. W. Whipple, Secretary.

Feb. 22-26.....Kansas City, Mo., Convention Hall, Fourth Annual Automobile Show.

March 5-12.....Boston, Mechanics' Building, Eighth Annual Automobile Show, Boston Automobile Dealers' Association. Chester I. Campbell, General Manager, 5 Park Square.

March 19-26.....Buffalo, N. Y., Convention Hall, Third Annual Power Boat and Sportsmen's Show. D. H. Lewis, Manager.

FOREIGN

Nov. 12-20.....London, Olympia, Eighth Annual International Automobile Show, Society of Motor Manufacturers and Traders.

AMERICAN

Races, Hill Climbs, Etc.

Oct. 28-30.....Dallas, Texas, Three-Day Track Meet, Dallas Automobile Club.

Oct. 30.....Vanderbilt Cup Race, Long Island Motor Parkway, Motor Cup Holding Company.

Nov. 6-8.....Phoenix, Arizona, Road Race, Maricopa Automobile Club.

Nov. 8-9.....Savannah, Ga., Georgia Highway Reliability Contest to Atlanta, Savannah Automobile Club.

Nov. 9.....Atlanta, Ga., Track Races, Atlanta Automobile Association.

Nov. 20-21.....New Orleans, Annual Fall Meet, New Orleans Automobile Club. Homer C. George, Secretary.

Nov. 22.....Denver, Col., Start of "Flag to Flag" Reliability Run. G. A. Wahlgreen, Manager.

Dec. 29-30.....Philadelphia, Fourth Annual Midwinter Endurance Contest, Quaker City Motor Club.

Feb. 4-6.....New Orleans, Annual Mardi Gras Speed Carnival, New Orleans Automobile Club.

CARL FISHER BECOMES A BENEDICT

INDIANAPOLIS, Oct. 23—Carl G. Fisher, one of the best known automobile men in the West, was married to-day to Miss Jane Watts at the home of the bride's parents in North Capitol avenue. Following the ceremony, Mr. and Mrs. Fisher left for Chicago, and will go from there to California and Mexico for an extensive motor trip. Mr. Fisher has taken a house at 50[illegible] North Capitol avenue which they will occupy on returning to the city.

Mr. Fisher is president of the Indianapolis Motor Speedway Company; president of the Presto-O-Lite Company, and treasurer of the Fisher Automobile Company, as well as an officer and large stockholder in the Empire Motor Car Company.

What the Clubs Are Doing These Days

BOTH PHILADELPHIA CLUBS WANT HOMES

PHILADELPHIA, Oct. 23—One result of the success of the Quaker City Motor Club's efforts in connection with the Fairmount Park race is the revival of the agitation for a clubhouse. The thousands of out-of-town visitors were astonished to find that the club was housed in a three-room suite in the Hotel Walton, and even though all the comforts of a modern hotel were within call, the guests could not be welcomed with the freedom and lack of restraint possible in private quarters. E. H. Fitch, George M. Graham and Allen Shelden have been appointed a committee on ways and means, and are now considering the question.

The Automobile Club of Philadelphia, which has an even smaller suite across the street from the Hotel Walton, also has the clubhouse bee in its bonnet. With 955 members on the rolls, it looks as if this organization is in even better shape than the Quakers to undertake the responsibilities of a householder. Dr. D. Braden Kyle is chairman of the committee having the matter in charge. The club is continuing its efforts in the sign-boarding line, and its display of signs, maps and road books at the Cleveland Good Roads Convention drew much favorable comment.

CANADIAN AUTO CLUB MAY TAKE UP AVIATION

MONTREAL, Oct. 23—"The Automobile and Aerial Club of Canada" will be the future title of what is now the Automobile Club of Canada, if the directors' resolution to take up aviation as a joint sport is adopted by the members at the annual meeting. The directors met yesterday afternoon and enthusiastically endorsed a proposition to extend the club's sphere of activity in this manner; they see a big future ahead for the aeroplane, and are anxious that theirs shall be the first club to take up the sport in Canada.

George Husson, manager of the Franco-American Automobile Company, of this city, has for some time been in communication with Louis Blériot, and has been assured that he could easily learn to operate one of the Frenchman's famous monoplanes. He expects to sail for France in November, and will spend three months looking over the machines turned out by the big companies. Curiously enough, much of the wood used by Blériot and other aeroplane constructions comes from Canada. The spruce of this country is found to suit admirably for many parts of the machines. Mr. Husson expects to bring back an aeroplane with him and begin flights.

PENNSYLVANIA CLUB'S THIRD ANNIVERSARY

LANSDOWNE, PA., Oct. 23—Two hundred members and guests gathered to celebrate the third anniversary of the Automobile Club of Delaware County, Pa., last Wednesday. The election was perfunctory, last year's officers being again chosen, as follows: J. H. Weeks, president; W. P. Anthony, vice-president; Dr. F. Marshall Harvey, secretary, and J. E. Mitchell, treasurer. The reports of the secretary and treasurer showed a membership of 410, and a balance of $710.02.

PITTSBURGERS WILL REWARD ROAD SUPERVISORS

PITTSBURG, PA., Oct. 25—At a banquet to be given by the Automobile Club of Pittsburg on Saturday evening, October 30, prizes will be awarded to more than 20 township supervisors who entered its good roads competition last February. More than $300 will be given in cash prizes and each supervisor will receive an additional gift of $5. The competition was for the purpose of seeing which supervisor could make the most improvement in his district during the season.

WASHINGTON CLUB HAS TWO HUNDRED

WASHINGTON, D. C., Oct. 23—The spacious country home of the Automobile Club of Washington was the scene of a merry gathering of motorists to-night, the occasion being the first of a series of stag smokers that will be held during the season. The clubhouse was thronged and a very entertaining bill was provided by the house committee. Six applications for membership were received. The club now has 200 members, and President W. D. West is determined to swell the number to 300 by the time of the annual meeting.

NEW YORK STATE CLUBS UNITE TO REPAIR BRIDGE

AUBURN, N. Y.—Oct. 23—The opening to the public of the free bridge across the Seneca River is directly due to the enterprise of the Auomobile Clubs of Auburn, Geneva and Syracuse. The State refused to appropriate the money for the repairs necessary to make the bridge safe and Cayuga and Seneca counties would only furnish between them $400 of the $1,500 required. At this juncture the Auburn club stepped in, and aided by the clubs of the two neighboring cities, made up the remainder. The club itself gave $150, the Geneva and Syracuse clubs gave $100 each, and the rest was from private individuals. President S. C. Tallman, of the Auburn Club, was in charge of the work.

Free Bridge Over the Seneca River, Near Auburn, N. Y., Repaired by the Local Automobile Clubs

THE LATEST NEWS FROM TIRETOWN

AKRON, O., Oct. 23—The increase in the capital stock of the Diamond Rubber Company, from $5,000,000 to $10,000,000, marks another step in the remarkable and rapid growth in the business of the company. The increase was made in the form of a stock dividend, and announcement was made that the company expects to pay 10 per cent annually on the doubled capitalization. In anticipation of the increase in capitalization, the stock climbed as high as 350, while in the panic several years ago it was as low as 95. The increase in capitalization was made at the annual meeting, when the old officers of the company were re-elected. The company increased its stock from $3,500,000 to $5,000,000 in 1907, when it took over the Bryant Steel Wheel & Rim Company.

A. H. Marks, vice-president of the Diamond company, last week accomplished the largest purchase of suburban land ever made here. He bought 30 acres just west of the city, for which he paid $91,000. The Diamond Rubber Company has decided to further increase its plant by adding two buildings, one to be six stories high and 371 feet long, with a width of 103 feet. The size of the smaller building has not been decided upon. The proposed larger building will add six acres to the company's floor space, and the building now under construction, which will be completed by January 1, will add another six acres.

The Goodyear Tire & Rubber Company began this week planning to more than double its tire output by January 1 next. The beginning of next month a night shift will be put on, and from that time on the plant will be run night and day. Vice-President C. W. Seiberling announced that by the end of this year the output will be increased from 600 tires to 1,400 and 1,500 a day.

The Diamond and Goodyear Tire & Rubber Companies have landed two of the largest individual tire contracts of the 1910 season. The former has secured a contract to furnish 28,000 tires to the Maxwell-Briscoe Company, and the latter an order for 10,000 sets, or 40,000 tires for the Buick Motor Company.

The annual meeting of the Northwestern Rubber Company, of Liverpool, England, was held in the offices of the Diamond Rubber Company here this week, resulting in the election of A. H. Marks as president; William Alex Smith, of Glasgow, as vice-president and treasurer. E. E. Buckelton, Liverpool, secretary and managing director. These, with O. C. Barber, of Akron, and Joseph Torrey, of Liverpool, are the directors.

WASHINGTON DEALERS ENLARGE

WASHINGTON, D. C., Oct. 25—In anticipation of the largest volume of business in the history of the industry in this city, the automobile dealers of the National Capital are enlarging their salesrooms and making additions to their lines.

The L. P. Dorsett Company is doubling the capacity of its salesroom and garage at Seventeenth and U streets, giving it storage space for 100 additional cars. This company, which has handled the Stoddard-Dayton and Babcock electric for several years, has taken on the Mitchell and the Empire.

Chas. E. Miller & Brother, Ford agents, are remodelling their salesroom on Fourteenth street.

The Overland Automobile Company has secured a permit for the doubling of its garage at 1215 V street.

The Dupont Garage Company, which handles the Lozier, Columbia and Detroit electric, has opened a salesroom at Thirteenth and G streets, in the downtown business section.

The Motor Sales Company has relinquished the agency of the Herreshoff, and has taken the Moon and Rauch & Lang electric.

The Newbold-Speedwell Company has been formed to handle the Speedwell and has secured quarters with the Warner Motor Company, at 1206 New Hampshire avenue. G. H. Covert has been made manager of the Warner Company, succeeding A. Parker Warner.

The Roman Automobile Company, of Philadelphia, has opened a branch store on H street, and will feature second-hand cars.

The Wilson Company has moved into its new salesroom and garage at 1333 Fourteenth street, and taken on the Hupmobile.

$1,000,000 ROAD—JERSEY CITY TO NEWARK

NEWARK, N. J., Oct. 25—When the date of November 9 was set for the reception of bids to complete the gigantic Plank road project the friends of the movement for a real highway between Newark and Jersey City felt one big step had been made.

This road project has been under way for years, the object being the replacement of the present apology for a road with a up-to-date highway worthy of the name. While the original plans called for planks as a surfacing material, similar to the present surface of the road, the latest idea is to build a road with one of these materials: Medina sandstone, wood blocks, or granite blocks. The one to be used will be determined by the joint committee from Hudson and Essex counties, which committee is in charge of the whole work.

Among the features of the road which are worthy of mention are the following: The road surface will be widened to 100 feet, of which width some space on each side will be given over to the Public Service Company for trolley cars, those on one side of the road running to New York and the others to Newark. There will be 28 feet of roadway running east and west, and two sidewalks each 21 feet wide.

Important in the list of changes which this will necessitate is the bridge which will have to be built across the Passaic river. Proceedings to condemn the necessary land along each side of the present roadway have already begun and in one very important stretch this additional width of land has been donated. This is between the Passaic and Hackensack rivers, and was given outright by the Hackensack Meadows Company.

Expenses of the road improvements have been agreed upon, the two counties affected bearing the burden in proportion to the benefit derived from it. Thus, Essex county, to which the highway will be the more important, will pay for five-eighths, while Hudson county will pay the other three-eighths. This is with the exception of the big bridge, of which the trolley company will pay 25 per cent., after which the remaining expense will be shared by the counties in the same ratio.

NEWS PICKED UP IN FACTORY CALLS

The Simplex Motor Car Company, Mishawaka, Ind., with facilities to build the entire car, tires and ignition excepted, is rushing the work on this year's model and adding to the plant for future increased output.

The General Manufacturing Company, Elkhart, Ind., with added facilities, has contracted to build transmissions, clutches and motors in a large way for several of the Detroit makers who were caught in the material famine now on. The company is just finishing five hundred motors for the International Harvester Company.

The Elkhart Motor Car Company, Elkhart, Ind., makers of the Sterling, with a large new plant, reports material slowly coming in, but from appearances the company will put out three thousand cars this year. President Sterling just closed with the California agent to deliver two hundred cars.

AUTO SCHOOLS OPEN FOR SIXTH YEAR

What is probably the largest automobile school in the United States, and certainly is the biggest in New York City, opens to-night. This is the automobile school of the West Side Y. M. C. A. located on West Fifty-ninth street. The sixth year of work will be formally ushered in at a meeting in the auditorium at which several addresses will be made. Among the speeches and speakers are: "The Automobile and Aeronautics," Augustus Post, secretary of the Aero Club of America; "An Illustrated Look into the Rural Future of the Automobile," J. George Frederick, editor *Printer's Ink;* "The Outlook of the Automobile Industry," Hon. C. Andrade, Jr., attorney for New York Automobile Trade Association; "The Auto Driver and the Policeman," William McAdoo, former Police Commissioner, New York City.

GEMMER STEERING GEAR IS MUCH IN EVIDENCE

VARIETY seems to prevail in styles and types of steering gear used in automobiles, and it is a liberal education to visit the plant of the Gemmer Manufacturing Company, at Detroit, and take time enough examining into the process to learn how the gears are made. This plant was originally fitted out to make the Gemmer steering gear, but as demands increased and different designers of cars expressed preferences for other types of gears for reasons that seemed good to them, the maker of the Gemmer bowed to the will of the purchaser, fitted out more completely, and to-day in this plant it is possible to procure in quantity any of the several types of gear for which there is a material demand.

In the meantime, according to President Hammond, of the company, the variety of demands on the part of automobile designers is a source of extra cost, complicates the situation unduly and deliveries are rendered much more uncertain, so that uniformity would be a boon to the industry and standardization is a crying need.

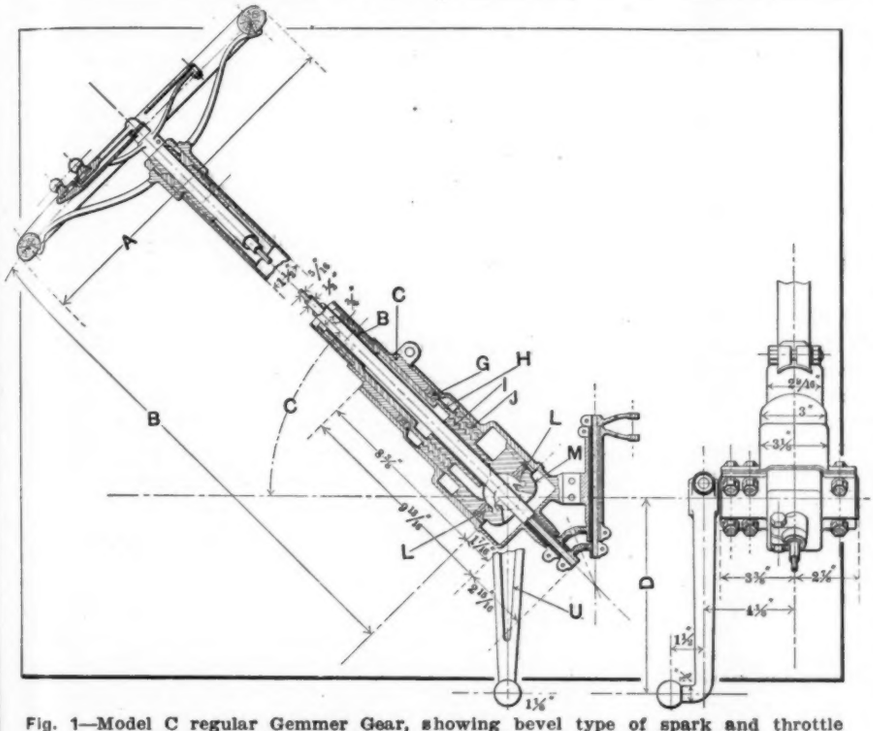


Fig. 1—Model C regular Gemmer Gear, showing bevel type of spark and throttle connections, mode of control, and well-designed steering arm

The plant, which has been considerably more than doubled in recent times, is substantially fireproof, the idea being to reduce the chances of defaulting on contracts from this cause, and the shop system is so contrived that good work, reliability and freedom from labor trouble are regarded as of the greatest importance.

Foundry Products Are Stored Up—Most of the gear housings are made of malleable iron and any one familiar with this situation will readily understand that there is great uncertainty attending the procuring of the same. To guard against a famine of malleable iron it is necessary to carry a year's supply ahead and much room is taken up in storing this class of material. In the same way, drawn-steel tubing is stored, practically on a basis of a year's supply, and, according to the experience of the company, it is not enough to place orders and fix the time of delivery. The material must actually be delivered, stored, and the actual cash outlay is therefore very considerable, none of which can be recovered until the steering gears are delivered to makers of cars from time to time agreeable to contract conditions.

Shop Equipment Extensive and Complete—The several types of worms, sectors and other designs of gears are made of a free-cutting "cementing" steel, capable of being fashioned in automatic machine tools to the greatest possible extent, and special hobbing machines are employed in hobbing the worm threads. The parts are forged in dies, and in order to relieve strains they are annealed and otherwise prepared for the hobbing process. The above process applied to all of the types of worms and gears made, and after the hobbing is done and threads are cut, the worms and sectors are cemented and with a suitable depth of the carbon penetration as a result of cementing, they are water quenched to render the surfaces of the threads glass hard.

The class of material used is of such a high grade that water quenching is practicable, and the kinetic properties of the steel are assured by an intermediate oil-quenching process. In this way the worms and gears, without respect to type and price, are all of the same finish hardness and so uniform in structure as to leave nothing to be desired.

Regular Gemmer Gear Ranks as Standard—Fig. 1 depicts the regular Gemmer type of gear, the particular one being the Model C, and since the figure is in cross-section it will scarcely be necessary to discuss the working of the gear at great length. The first point to be readily disposed of is that of the concentric disposition of the spark and throttle rods; they pass up through the column to levers on the wheel and motion is imparted to the rest of the system by means of a bevel-gear system attached to the housing at the bottom end of the column.

The steering wheel may be of any desired diameter, the usual range being about 16 inches. The wood may be mahogany, black walnut or other selection and the manner of fastening the wood may be selected by the buyer with the understanding that the price will change accordingly.

Where the column is brazed to the gear a key is used as a safety measure so that, should the brazing fail, the key will have to be sheared off before the wheel will fail. That the key would shear off is not at all likely and the only thing that can happen is that lost motion might be developed, which lost motion would serve as a warning to the motorist that the brazing has failed and should be attended to.

This question of brazing, according to Mr. Hammond, is one that is in need of backing up by an independent safety measure on the ground that even a man of skill cannot be dead sure that the brazed joint is perfect and a separate key, in addition to brazing, affords a due measure of safety.

Principle of the Gemmer Gear—Referring to Fig. 1, the nut H has a right-hand thread outside engaging with nut J and left-hand thread inside engaging with nut I. When the wheel is rotated in one direction, thus rotating the nut H through the column B by the action of the right and left-hand threads, one nut is forced down against one of the pivot blocks L, depressing that side of the rocker shaft M and at the same time the other nut is raised. This action rotates the shaft giving the lever U its movement. Rotating the steering wheel in the opposite direction, the action on the shaft M moves the lever U in the opposite direction.

In view of the importance of adjustment of steering gear,

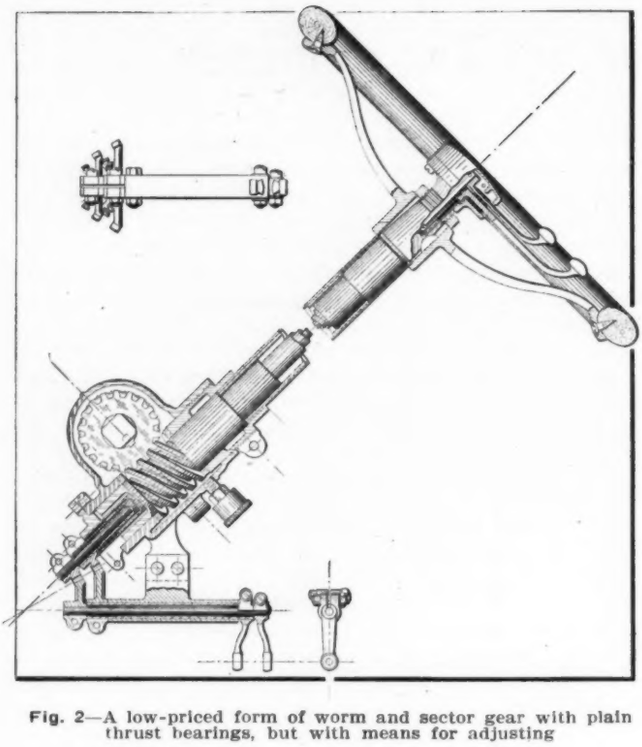


Fig. 2—A low-priced form of worm and sector gear with plain thrust bearings, but with means for adjusting

considering how very desirable it is to eliminate lost motion, it will be of advantage to notice that all the work done in imparting motion to the rocker shaft M is in compression. The nut J presses on one side, giving a movement in one direction and I presses on the other side, imparting the reverse movement. Under the circumstances the wear on the thread comes on one side only and if the adjusting nut C is screwed down to take up any lost motion there may be in ball thrust G, and continuing, presses on the nut H, which in turn pushes down against the nuts I and J, brings the bearing surface of the threads in contact and I and J in turn are pressed down against pivot blocks L and they against their bearings on the shaft M, thus eliminating lost motion at all points.

Shoulders will not form, as is bound to be the case in worm and sector types of gear, because in this type of gear any movement from the neutral point causes the wearing surfaces to overrun, hence shoulders are prevented from forming, so that after adjusting the mechanism will not bind.

Worm and Sector Types Are Much Used—From the Gemmer to worm and sector types is a considerable deviation, yet even so, a considerable part of the business of the company is that of building worm and sector types of gear, and Fig. 2 depicts the type C gear, which is the lowest priced product the company turns out. The work is keyed onto the spindle and a taper pin is fitted to a taper hole through the shell of the gear and the tube to prevent the worm from floating off. Bearings are of phosphor bronze, long and nicely fitted, and means are provided for adjusting the thrust surfaces up against the ends of the worm as the occasion requires.

In this class of worm and gear the quality of the material used is up to the customary standard of the company and the reduction in price is brought about merely by adapting the parts composing the gear to automatic machine tools, the use of plain but adjustable thrust bearings, instead of ball types, and in such other little economies as quantity production naturally falls heir to. The spark and throttle levers on this wheel as shown are different from those depicted in Fig. 1, but this is a matter which may be adjusted to suit the purchaser, who may choose any one of a number of systems available, paying the difference if there is any.

Fig. 3 shows the type K worm and sector gear, which is a more costly product than the gear shown in Fig. 2, primarily due to the use of a ball-thrust bearing and to such other little refinements as a difference in price will naturally support. This gear is used on cars weighing up to 4,000 pounds, is provided with a quadruple thread, 2-inch lead, six pitch, 5 1-2 to 1 ratio of worm to sector and the throw of the lever is 65 degrees per turn of the wheel. Special designs necessarily interfere with delivery, and are at extra cost. As a rule, quality is more dependable if regular designs are used.

Steering Wheels in Divers Forms—In some examples the spiders of the wheels are of bronze, but aluminum is the favored material. The spokes in each case are dished, internal strains are eliminated, and "wasters" are reduced to a minimum. The wheels shown in the figures are of the class with the wood work fastened on by means of screws, but in the finer examples of work in the Gemmer plant the wood is laminated, using mahogany for the purpose, and the lamanæ, after being built up and glued on to the flange of the spider, are finished.

The finish may be in natural mahogany, rosewood or any other style, and the character of the finish depends upon the amount of money the purchaser wants to pay. The strength of the wheels is not dependent upon the finish, and it is the claim of the maker that the wheels on the lowest priced gears are quite as safe and secure as the products with the highest finish.

RELATION OF GASOLINE VAPOR TO AIR

In any discussion of the relation of gasoline to atmospheric air, it becomes necessary to carefully distinguish as between vaporized and liquid gasoline. With air at 60 degrees Fahrenheit, about 15 per cent. of true gasoline vapor will produce a state of saturation. Such a mixture would be non-explosive, and in practice the following holds:

Volumes of gasoline vapor in per cent of air volumes	*Volumes of atmospheric air at 60° F. corresponding	
15.0		Saturation point of air at 60° F.
5.5	3,400	Too rich to serve for the purpose
4.0	4,000	Uncertain in its action
	5,000	
	6,000	
	7,000	
1.9	8,000	Suitable for the best results
	9,000	
2.4	10,000	Too uncertain to be of value

*In the above table the volumes of air relate to one volume of liquid gasoline, whereas the vapor volumes are in percentage of the air volumes used in each case. Absolutely accurate determinations will depend upon the mixture being of a definite character.

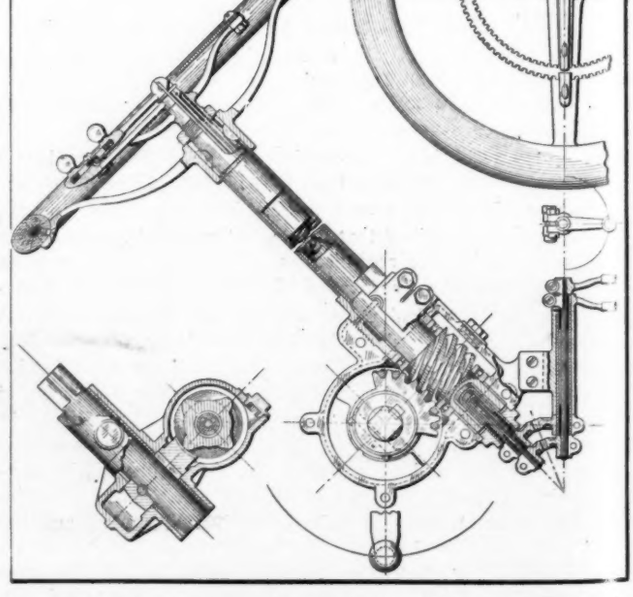


Fig. 3—Model K worm and sector gear with bevel spark and throttle, and ball-bearing thrust

IN AND ABOUT THE GARAGES

Pittsburgh—The Standard Automobile Company has let the contract for a four-story garage, 215 by 70 feet, at Grant Boulevard and Bellefield avenue. It will be finished in gray pressed brick and terra cotta, and the cost is estimated at $125,000. Plans are being prepared for a garage to be used by a new taxicab company at Grant Boulevard and Craig street. This will be four stories high and 135 feet square, and is to have one of the most complete repair shops in the city. At Butler, Pa., 30 miles north of Pittsburgh, the Atwell Automobile Company has broken ground for a $25,000 garage, two stories high, in which the Oldsmobile and Cadillac will be sold.

Philadelphia—The Regent garage, 4525 Springfield avenue, has recently doubled its storage capacity by the erection of another building, giving the largest unobstructed floor space of its character in the city. Its depth is now 227 feet and width 50 feet, and it is also remarkable from the fact that it has two six-foot skylights each 76 feet in length. There are now two entrances to the garage, the former one on Springfield avenue, and a new one from Baltimore avenue, so that cars may enter or leave from either street. Frederick K. Mears is the proprietor.

Gouverneur, N. Y.—F. N. Freeman, representing the Gouverneur Maxwell-Briscoe Motor Company, has just completed one of the finest garages in the State. It has been built to accommodate the great number of tourists, en route from southern and western points to the St. Lawrence, Montreal, and Plattsburgh. The floor space is 75 by 110 feet in size, giving space not only for the storage of many cars, but also for the repair shop, and a stock room with all kinds of general parts and accessories. A finely appointed women's waiting room is a feature.

Baltimore—A garage is being erected at Charles and Twentieth streets by the Dixon S. Walker Auto Company, agent for the Studebaker. The company's business has outgrown its garage at 1917 North Charles street, which was new only a year ago. The new garage will front 175 feet on Charles street, with a depth of 80 feet. Charles H. Evans has opened the Northeastern Garage, at Regester and Federal streets. The building has a capacity of 30 machines.

St. Augustine, Fla.—The St. Augustine Machine Company has arranged to build a large addition to its garage on Granada street. At present the quarters are 40 by 46 feet in size, and with the new part will be increased to 40 by 120. This will greatly enlarge the storage capacity and will also give space for a well equipped repair shop. The proprietors have also decided to increase the gasoline storage capacity to 500 gallons.

Pittsburgh—The E. J. Thompson Company has purchased a site on New Louisa street, near the world's biggest baseball grounds, on which to erect a garage. The property is 75 by 110 feet. A concrete garage to cost $50,000 will be erected.

New Fireproof Garage of Easton Auto Co., Easton, Pa.

Newark, N. J.—The Newark Auto and Engineering Company is building a salesroom and garage at 318-320 Broad street, north of Belleville avenue. The building will be 50 by 100 feet, of brick and steel construction with stucco front and one story high. The company holds the agency for the Rambler. Temporary offices are located at 151 North Sixth street.

Augusta, Ga.—The communistic garage, proposed by President C. B. Garrett of the automobile club, is finding favor among local autoists. It is probable that no difficulty will be found in getting 30 men to subscribe $500 each for stock, and then the building will be erected. It is planned to have it centrally located.

Baltimore—The Ford Automobile Company has arranged to build a modern garage on West North avenue. The site is 40 by 110 feet in size and the building will be two stories high, with the lower for show purposes and the garage, while the upper will contain the offices and repair shop.

Valdosta, Ga.—Ground has been broken for a new garage by A. A. Parish. The location is at 116 and 118 West Central avenue, and the building will be 60 by 90 feet in size. It will be fully equipped with repair shop and features for caring for the cars on storage.

Cincinnati—The Evanston Automobile & Garage Company has been recently formed in Cincinnati, with headquarters at 3705 Main avenue. Charles Schiear, C. Roy Clough and F. T. Larson are the organizers, and the agency for the Velie and Hupmobile has been taken.

Columbus, Ga.—The Georgia Automobile Exchange has purchased a lot on Second avenue, and will start the erection of a $10,000 garage for its own use.

Garage and Salesrooms of C. W. Gray, Watertown, N. Y., Which Has Just Been Completed

This garage is one of the most complete establishments of its character in the northern part of New York State, and is the home of the Franklin agency for Watertown and vicinity. The ample floor space and interior arrangements make it particularly available for the expeditious handling of cars

A. G. Vanderbilt on Coaching Trip Uses White Steamer as Tender

On the recent trip of the New York Coaching Club from New York to Newport in Mr. Vanderbilt's coach "Pioneer," a White Steamer accompanied the party as "tender" and general utility and emergency wagon. The White was used to carry extra parts for the coach, for running ahead and making arrangements at the ferries, and for bringing news of the approach of the coach to the stations where the horses were to be changed. Occasionally, when it was necessary to lighten the load of the coach on a steep hill, four or five of the passengers would transfer themselves to the automobile

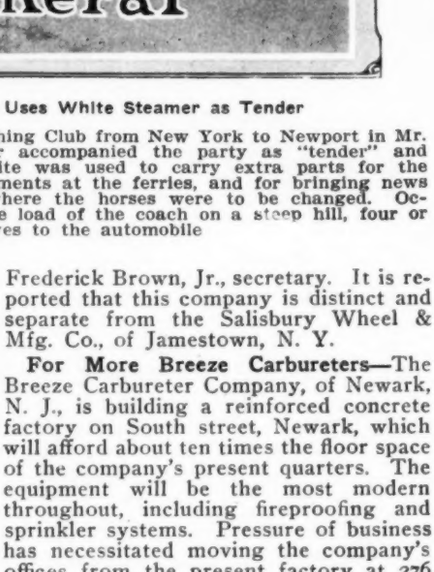
Pierce-Arrow Auto School.—As in former years, the Pierce-Arrow Company will conduct a free school of instruction, divided into three sections, for owners of Pierce-Arrow cars, drivers, and dealers and repairmen. Each class will last two weeks, beginning soon after the first of the year and continuing through the Spring. Two classes will probably be set apart for colored men. The classes for owners will contain more of driving instruction than the others, while those for drivers will be taken up largely with a thorough foundation in the care and maintenance of the cars. Dealers and repair men will be well grounded in the principles of construction and in the making of adjustments. Driving of the cars does not predominate in any of the courses, although it has a part in each. A six-cylinder 48-horsepower car will be used in the instruction school. No fee is charged, the only requisite being that the entrant be an owner, driver of or dealer in Pierce-Arrow cars, bearing a letter of identification from the dealer in his district.

Firestone Says 135,000 Cars—The published claims of automobile makers as to their productions during the coming seasons may occasionally need to be taken with a grain of salt, but the purchasing departments of those makers are not likely to order more tires than they can actually build cars. H. S. Firestone, who naturally has opportunities to obtain inside knowledge of the plans of the purchasing departments, conservatively estimates that the production for 1910 will be about 135,000 cars. Mr. Firestone also expresses a belief that one-third of the cars will leave the factories with demountable rim equipment.

Prospects at Peru, Ind.—The Peru Auto Parts Mfg. Co., recently organized at Peru, Ind., with a capital of $200,000, has purchased a $60,000 plant on the lines of the Wabash and L. E. & W. railroads and will begin immediately the manufacture of automobile wheels, axles and other parts. The officers of the company are S. H. Penfield, president; John Tomey, vice-president and treasurer, and Frederick Brown, Jr., secretary. It is reported that this company is distinct and separate from the Salisbury Wheel & Mfg. Co., of Jamestown, N. Y.

For More Breeze Carbureters—The Breeze Carbureter Company, of Newark, N. J., is building a reinforced concrete factory on South street, Newark, which will afford about ten times the floor space of the company's present quarters. The equipment will be the most modern throughout, including fireproofing and sprinkler systems. Pressure of business has necessitated moving the company's offices from the present factory at 276 Halsey street to 14 William street, the space vacated by the office being devoted to manufacturing.

Grout in Suburban Service—George H. Prouty, of Barre, Mass., has put in service a nine-passenger Grout between Petersham and Barre, carrying passengers and mail. The car has three seats, seating three passengers on each, and is finished with unusual elegance, considering the service in which it is used. Its maximum speed is about 30 miles an hour. Mr. Prouty expects to put a 12-passenger car in operation soon.



New Maxwell Branch at Albany, N. Y.

Ohio Electrics at Toledo—The stock of the Ohio Electric Car Company has all been subscribed in Toledo by twenty capitalists of that city, each taking the maximum of $5,000. The office and works of the new company are located at the Milburn Wagon Company's plant and a large force of men is already at work there on the bodies. One type of electric chassis will be built.

Big Ball Bearing Order Placed—From the J. S. Bretz Company, with offices in the Times Building, New York City, the E-M-F Company has ordered 20,000 F. & S. ball bearings for 1910 cars. These are to be used on the main driving pinion for live rear axles, and are arranged for both thrust and radial loads.

NEW YORK TRADESMEN ENERGETIC

For some time past, members of the New York Automobile Trade Association have not been entirely satisfied with the work of the organization, and the subject received considerable attention at a recent midday luncheon, held at the Hotel Cumberland, on Broadway, and presided over by Gen. John T. Cutting, twice-elected president. A committee was appointed to revise the present constitution and by-laws, which have not enabled the association to enlarge its scope to meet changing conditions. President Cutting advocated greater interest in metropolitan automobiling.

Among the other association members who spoke were: C. Andrade, Jr., of the R. M. Owen Company; J. F. Plummer, of the Locomobile Company; Robert Slusser, of the Harrolds Motor Car Company; W. W. Burke, of the Mora Motor Car Company, and C. W. Wurster, of Wyckoff, Church & Partridge.

NEW MAXWELL BRANCH AT ALBANY

The Maxwell-Brisco Motor Company has opened a branch at 72-74 Central avenue, Albany, N. Y., where it has one of the finest show rooms in that portion of the Empire State. W. K. Hadley, a veteran in the automobile field, has been appointed manager. He has been connected with the sales department of the home company for the past three years in a traveling capacity.

IN AND ABOUT THE AGENCIES

Pennsylvania Agencies—The following agencies are announced by the Pennsylvania Auto Motor Company, Bryn Mawr, Pa.: Middleton Motor Car Company, 548 Golden Gate avenue, San Francisco; Vail Motor Car Company, Los Angeles, Cal.; Lemly-Mills Auto Company, San Antonio, Tex.; Pennsylvania Sales Agency, Atlanta, Ga.; D. A. Kendall Motor Company, Kansas City, Mo.; H. Weston, Jacksonville, Fla.; Pensacola Buggy Works, Pensacola, Fla.; Pennsylvania Selling Agency, Providence, R. I.; Murray O'Neill, New Bedford, Mass.; Haynes Automobile Company Minneapolis, Minn.; Oliver De Charme, Troy, N. Y.; Philip A. Lowe, Pittsfield, Mass.; C. W. Fulkerson, Carbondale, Pa.; Pennsylvania Selling Agency, 609 Neville street, Pittsburgh; Walter Slack, Trenton, N. J.

Winton, Philadelphia—Manager A. E. Maltby, of the Winton branch at Philadelphia, has decided to rebuild on the site of the present building at 246 North Broad street, the specifications calling for a two-story structure with a floor space of 25,000 square feet. The first floor will be occupied by showrooms and offices and the second by shops, stock rooms and storage. Pending completion, which cannot be before March 1 next, the Winton agency will be in temporary quarters at Broad and Race streets.

Packard, Philadelphia—After November 1 the Packard, for many years represented by the Keystone Motor Car Company, will be handled direct from the factory through a branch house. Just who will be the head of the branch has not been announced. It is understood, however, that the establishment of the Keystone Company, on North Broad street, will be bought outright.

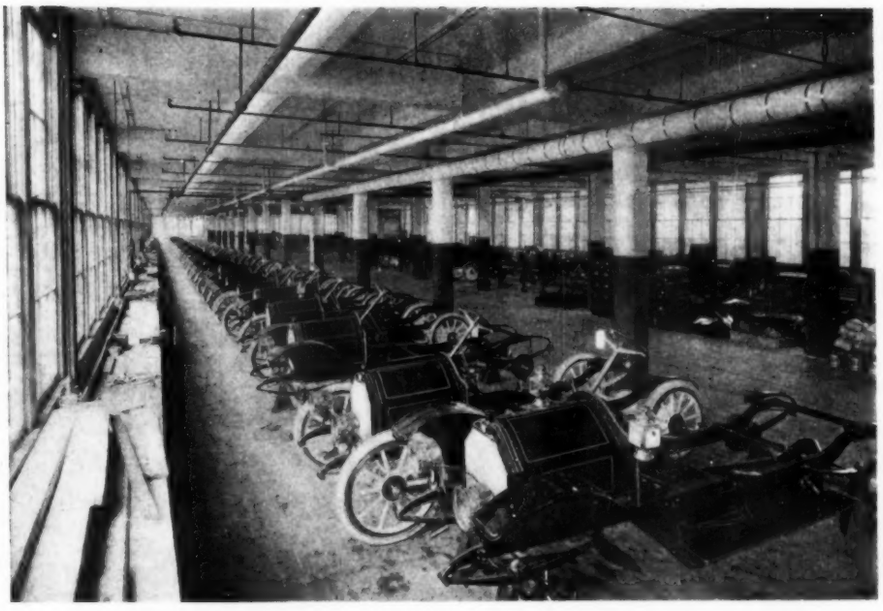
Bosch Magnetos, San Francisco—The Bosch Magneto Company has established a branch at 537 Van Ness avenue which is to be its headquarters for the West and the Pacific Coast. A stock will be kept of the various types of Bosch magnetos and their fittings and parts, and the new branch will be conducted in the same manner as the New York main office and the Chicago branch.

Continental Tire Agencies—Additional distributing agencies of the Continental Caoutchouc Company are the Gibson Automobile Company, 238 Massachusetts avenue, Indianapolis, for a part of Indiana; the Jas. S. Bailey Company, Portland, Me., and the Auto Supply Company, Baltimore, for the entire State of Maryland.

National and Standard, Omaha, Neb.—The Standard Automobile Company, composed of H. E. Wilcox and Charles Merz, who is to drive a National in the Vanderbilt, is building a garage on Farnam street, west of Twenty-fourth, where it will sell National and Standard Six.

Jackson, Philadelphia—S. R. Blockson has been awarded the agency for the Jackson, which he formerly handled with much success at Pedricktown, N. J. He will be with the Stoyle-Vogel Company, Broad and Race streets, until he secures permanent quarters.

Royal Tourist, Minneapolis, Minn.—I. A. Thorson and E. G. Johnson have organized the Royal Automobile Company to represent the Royal Tourist, with an office at 717 Hennepin avenue.



Assembly Floor of the Chalmers-Detroit Motor Company, Detroit

The entire second floor of the new building of the Chalmers-Detroit factory is used for assembling finished cars. The above picture shows one section of the floor containing chassis waiting for bodies to be fitted thereto, and the final touches applied before testing and shipment

American and Moon, Omaha, Neb.—The recently incorporated Sweey-Edwards Automobile Company will handle the American and Moon and expects to be installed in a new garage on Farnam street by December 1.

American Simplex, New York City—S. J. Wise has been appointed metropolitan agent for the American Simplex and has established headquarters at Broadway and 54th street.

Acme, Pittsburgh—L. Glesenkamp, Sons & Company have secured the Acme agency, and will also handle the Glesenkamp-Martin commercial car, a local production.

Baker, Wilmington, Del.—Col. G. P. Postles, who is the agent in this city for the Chalmers-Detroit and Hudson, has taken the representation of the Baker electric.

Kline-Kar, San Francisco—The Frank O. Renstrom Company, of 424 Stanyan street, opposite Golden Gate Park, has taken the agency for the new Kline-Kar.

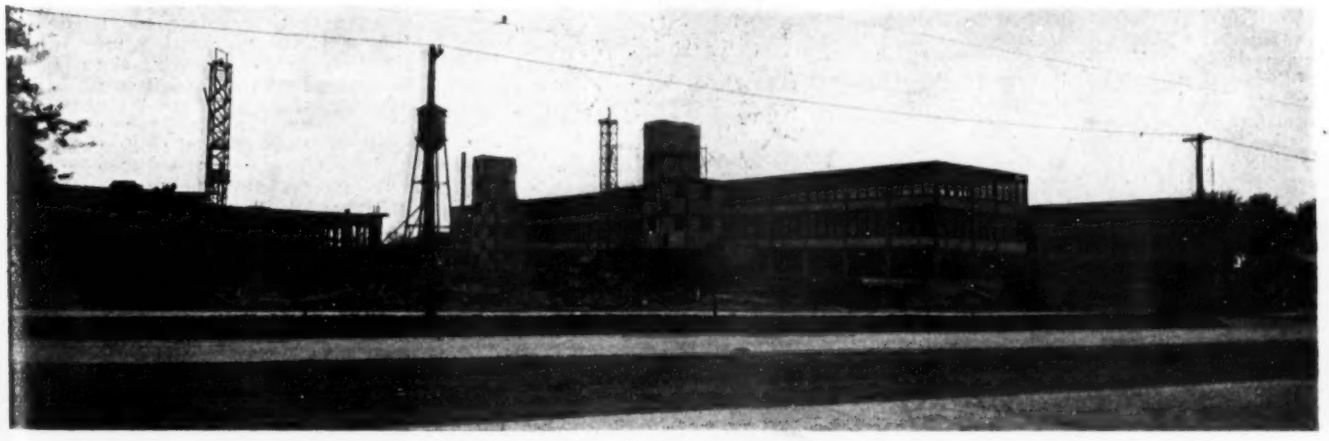
PERSONAL TRADE MENTION

A. D. Frost, formerly sales manager of the Harry S. Houpt Company, New York City, in which capacity he had charge of the distribution of the 1909 Herreshoff, has been appointed sales manager of the Herreshoff Motor Company, of Detroit. The 1910 Herreshoffs will be marketed direct from the factory.

William F. Horner, resigning from the automobile editorship of the New York *Press*, has taken a similar position with the Brooklyn *Eagle*. William Newton, formerly of the *Eagle*, succeeds Mr. Horner on the *Press*.

H. W. Doherty, sales manager for the Cameron Car Company, Beverly, Mass., for the past two years, resigns his position with that company November 1. Mr. Doherty has not announced plans.

William J. Urquhart has been promoted to be general manager of the Western sales department of the White at Chicago. C. A. Hawkins will devote attention to Pacific Coast sales.

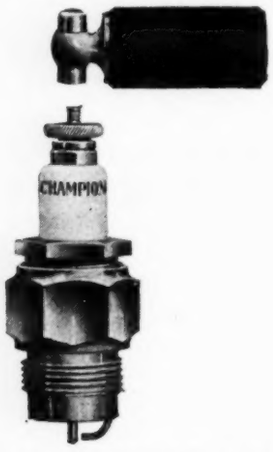


Rapidly Developing Plant of the Chalmers-Detroit Motor Company at Detroit

The photograph shows some of the additions now under way. To the extreme right is shown the old factory building, while in the center is the recently completed addition. To the far left is the first floor of a contemplated four-story duplicate of the other two main buildings. Additional floors are now being added to the original building as well as the completed new building

Information for Auto Users

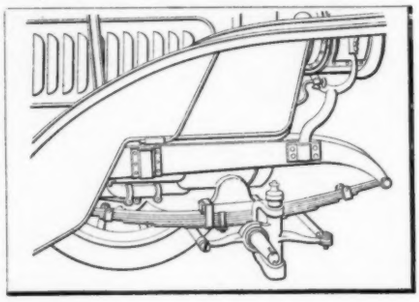
High Compression Spark Plug—In the construction of the Champion spark plug, the makers, the Champion Company, 36 Whittier street, Boston, use great care and the best of materials, so that the resulting plug is particularly suitable for cases where the duty is severe, as for use with high compression, with excess of oil in the cylinders, with magneto, etc. In fact, as to magneto, the makers say that this plug is particularly suited for that use, since the nickel-alloy points used are imperforable to spark of any intensity. Under the severe use demanded from a magneto plug, they will not burn off. One point



CHAMPION PORCELAIN SPARK PLUG

of sterling worth is that the center wire is firmly cemented and baked into the porcelain forming the central portion of the plug. This also prevents any possible leak of cylinder compression through that opening. Both shell and bushing are cut from solid stock, so that the porcelain does not contact with either.

Trailing Axle Spindle Makes for Safety—Since the public is always interested in any device which makes for increased safety without complicating the machine or materially increasing the cost, a short description of the principles and action of the B. & L. Front Axle Trailing Spindle will be of interest. This device is made by the Queen Mfg. Co., Webster City, Ia., and is intended primarily to be a safety device—a sort of life insurance. The axle spindle is set back of the center of the front axle by a predetermined amount, this setting back or offsetting resulting in the spindle, and with it the wheel, following a straight-ahead line, whether the cross-connection be severed or not. Thus, in case of an accident which breaks or loosens the cross rod, the car will continue straight ahead, regardless of that fact. It is claimed that, strictly aside from this safety feature, the car equipped with this trailing spindle, steers so much easier as to eliminate all fatigue from that cause. As proof of their claims, the manufacturers, who now have shop rights for sale, claim to have driven a machine thus equipped through eight loads of



B. & L. TRAILING FRONT AXLE

sand so distributed as to strike only the wheels on one side, this being done at a speed of 25 miles an hour, and without the hands touching the steering wheel. On this test the car did not vary 6 inches from a straight line.

Self-Adjusting Tire Tread—For the season of 1910, the Leather Tire Goods Company, now located at Niagara Falls, N. Y., have brought out a new style tire which will be welcomed by tourists who who have known and appreciated the Woodworth Adjustable Tread. The newer form differs from the old in the method of fastening the tread on the tire. The tread itself consists of a number of galvanized steel plates riveted along each side of the tread a short distance apart and connected by short, stiff

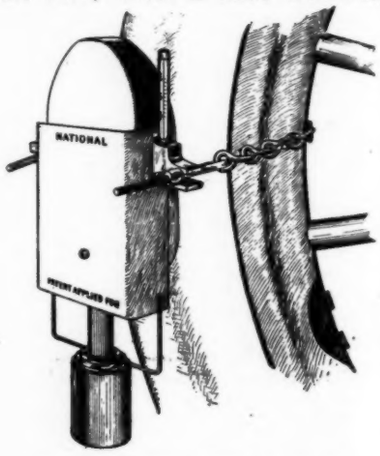
WOODWORTH SELF-ADJUSTING TREAD

springs. Each spring is linked to one end of a plate and has a hook at the other end. The tread is applied by slipping it sideways over the deflated tire with the springs unhooked. When in place, the springs are hooked into the plates, forming a ring around each side. As the tire fills out, the springs are stretched, holding the cover tight on the tire and ready to take up any slack.

More than this, the leather used in the new treads is treated by a new process, which the makers state doubles the life of the leather, preventing the action of dirt and water from affecting it. The new leather is of a dark green color.

The rivets used in this tread have thicker heads, thus adding greatly to the mileage obtainable. The corners of each rivet are rounded off so that they cannot be caught in such a way as to be forced out of the leather. More, the leather on each side of the heavy rivet is studded with smaller, flat-headed rivets, which, while adding little to the total weight, protect the leather in ruts, or on rocky roads.

New Small Vulcanizer of Simple Form—With the usefulness of a vulcanizer admitted and fast becoming well-known for its economical effect upon tire upkeep, there is a wide demand for a small and portable machine as opposed to the very expensive large ones, which are heavy and bulky to handle. The newest to appear is that of the National Motor Supply Company, Cleveland, which is called the National steam vulcanizer. This is a small device consisting of a brass shell, which is filled with water.



NATIONAL VULCANIZER IN PLACE

This shell may be held to the tire by means of small chains and screws with wing nuts to regulate the tension. In this way, the vulcanizing may be done right on the tire, allowing the use of the device out on the road if so desired. In addition, there is a small alcohol lamp or torch attached to the base of the brass shell, which is utilized to heat the water. This water is heated to such an extent as to turn it into steam, when the action of the vulcanizer proceeds just the same as any steam device. The size of the torch is such as to turn the water into steam in about 7 minutes, and a complete job in less than 15 minutes.

Aside from this, the National is very simple to operate, as there is nothing to get out of order. The flame guard is interchangeable from one side of the vulcanizer to the other, so that the flat side can be used for tubes and the concave side for shoes. A complete outfit is furnished, and since there is no danger of burning or otherwise injuring the tire, it makes a very efficient outfit for the private owner.